

RF
865.5
TS
DY

RESEARCH DESIGN FOR THE HISTORICAL ARCHAEOLOGICAL EXAMINATION
AND DOCUMENTATION OF THE REMAINS OF THE 1848 SIDEWHEEL
STEAMSHIP TENNESSEE AT TENNESSEE COVE, GOLDEN
GATE NATIONAL RECREATION AREA, MARIN
COUNTY, CALIFORNIA

James P. Delgado

Robert L. Bennett

PRINCIPAL INVESTIGATORS

IN CONSULTATION WITH:

Ray Aker

Marley Brown III

David Buller

John Haskell Kemble

Martin T. Mayer

G. Douglass Nadeau

Gary Pahl

Brother S. Dominic Ruegg, F.S.C.

William D. Sawyer

OCTOBER 1981

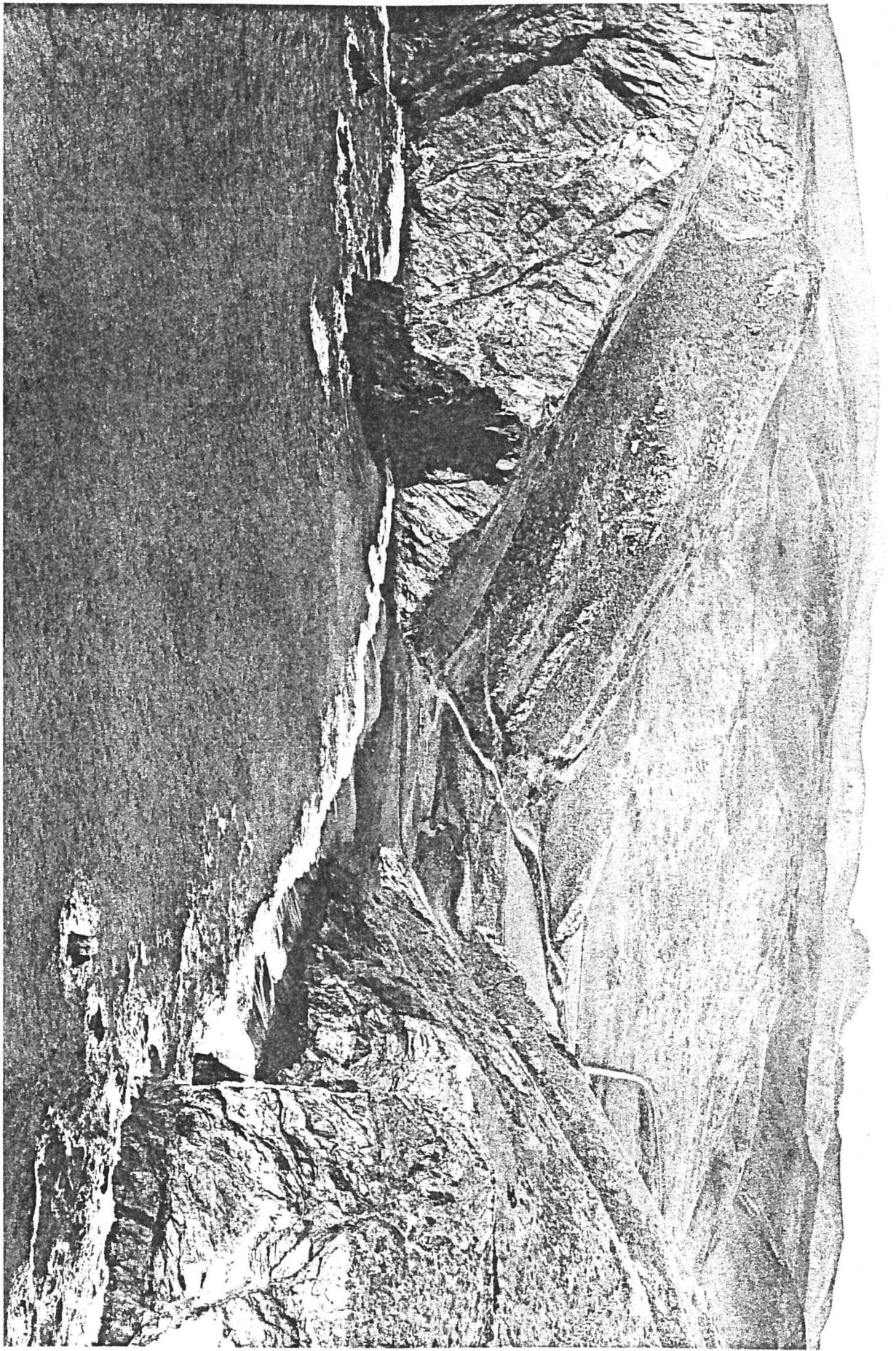


TABLE OF CONTENTS

	Page
INTRODUCTION	i
I. BACKGROUND INFORMATION	1
A. The Site	1
B. Site History	1
C. Previous Work	3
D. Compliance and Legal Aspects	4
II. HISTORICAL BACKGROUND	5
A. The S.S. <u>Tennessee</u>	5
III. ARCHAEOLOGICAL BACKGROUND	19
A. Hypothesized Components	19
B. Intrusive Elements	23
C. Benefits of Study	26
D. Research Questions	29
IV. PROPOSED METHODOLOGY	35
A. Historical Research	35
B. Archaeological Research	38
C. Interpretation and Presentation	42
BIBLIOGRAPHY	46
APPENDICES	
A. Listing in the National Register of Historic Places	
B. Federal Compliance	
C. State Compliance	
D. Correspondence	
E. Publicity	

INTRODUCTION

Archaeological site 4-MRN-506H, a National Register of Historic Places property partially administered by the United States Department of the Interior, National Park Service, Golden Gate National Recreation Area, is an important resource which deserves detailed and complete documentation. With the approval of the staff of the Golden Gate National Recreation Area, the Principal Investigators of this proposed project present a program of research and documentation to fully identify the extent and the integrity of the remains of the Gold Rush steamship Tennessee which comprise 4-MRN-506H. Such a goal is essential to fulfill the National Park Service's mandate to fully document significant resources under National Park Service administration. The project does not call for a complete excavation of the remains of the S.S. Tennessee, nor does it propose to answer all of the research questions posed in this document. It will hopefully answer some of the questions, and provide the basis for a refined group of other questions. One of the finished product of this project will enable the National Park Service to better manage this resource and to assess any future proposals for excavation.

There is a logical series of questions that could be asked by the interested layman, or by the professional. These questions might be: "Why spend time and money documenting the story of a ship's failure?"; "What is of scholarly or scientific interest in the examination of disaster?"; and "What can be learned from the particularistic study of the wreck of the S.S. Tennessee?" It is important to remember that the story of the Tennessee is more than a saga of adventure and disaster. It is more than a tale of survival, of courage, and of danger. A shipwreck

is not an isolated event. Its full interest and importance become apparent only when we study it within the context of the period when it happened. This involves knowing something about the technology of shipbuilding at the time, the skill and experience of seamen, the conditions of life on board, the risks that were deliberately run, the navigational and life-saving equipment available, the cargoes carried and the routes followed. (Hudson and Nicholls 1979:1)

The story of the S.S. Tennessee and of her demise involves a long and varied series of interconnecting circumstances and stories related to the progression of American naval design; its adaptation to an infant steam technology; the development of a new portion of the American nation; an event of major economic proportions, the California Gold Rush; and the intricacies of shipboard society and communities. There is also the story of a wreck; it was not a "notable" wreck in that there was no horrible loss of life, but now it is important in that the remains of the Tennessee still exist in a partially intact state with some scattered components as an archaeological record to provide a focal point for telling those stories. As a "time capsule" of information stricken by disaster, and as a moment frozen in time to draw attention to many facets and phases of human history, the wreck of the S.S. Tennessee is indeed significant, and its careful study essential.

The preparation of this research design involved the assistance and the cooperation of many individuals and organizations. The Principal Investigators wish to thank the following:

National Park Service, Golden Gate National Recreation Area: G. Douglass Nadeau, Chief, Division of Resource Management and Planning; Martin T. Mayer, Cultural Resource Specialist and Park Archaeologist; Judd A. Howell, Natural Resources Management Specialist; Nancy Hornor, Environmental Compliance Specialist; John B. Sage, Landscape Architect; John Martini, Park Technician; Lisle Lee, Administrative Assistant to the General Superintendent; Richard B. Hardin, Marin Unit Manager; Kristi Humphrey, Park Photographer; William Oswald, Supervisory Park Technician, Tennessee Valley Unit; Ron Gibson, Park Technician; Scott Tye, Lifeguard and Dive Team Member; Jay Eikenhorst, Aquatic Safety Specialist; Harlan Soeten, Curator, National Maritime Museum; John Maounis, Photograph Librarian, National Maritime Museum; Barbara Burkhardt, Assistant Librarian, National Maritime Museum; Harrison J. Dring, Ship Conservator, Historic Ships Unit, National Maritime Museum, Don Giovanetti, Maintenance Division.

National Park Service, Western Regional Office: Roger Kelly, Regional Archaeologist; Gordon Chappell, Regional Historian; Richard Frear, Regional Photographer; Leo Barker, External Programs Archaeologist.

United States Geological Survey: Mr. Ken Lajoie, Mr. John Dingler; Mr. R. Hunter; W. Rambor.

National Museum of American History, Smithsonian Institution: Mr. Robert M. Vogel, Curator, Division of Mechanical and Civil Engineering; Mr. Robert Post, Curator, Marine Transportation Section.

San Francisco State University: Professor Rodger Heglar, Department of Anthropology; Professor Gary Pahl, Department of Anthropology.

College of Marin: Betty Goerke, Instructor, Department of Anthropology; Diane Wickstrom, Instructor, Department of Anthropology; and their students.

National Maritime Museum Association: Mr. David Nelson, Executive Director; Mrs. Sara Nome, Administrative Assistant.

The late Mr. Roger Olmsted; Mrs. Nancy Olmsted; Mr. Raymond Aker; Mr. Marley Brown III; Professor John Haskell Kemble; Mr. William D. Sawyer; Mr. Doug Desseau; Mr. James Normandie; David and Steven Buller; Brother S. Dominic Ruegg, F.S.C.; Ms. Barbara Hack; Mr. Edward Peterson; Mr. Miley Holman; Mr. Ross Johnston, GeoMetrics; Mrs. Dorothy S. Gould; Mrs. Elizabeth Ashley; Mrs. Lois Gilchrist; Mr. Phillip Bundschu; Mrs. Nance A. Webb; the staffs of The Bancroft Library, University of California, Berkeley; the Doe General

Library, University of California, Berkeley; the Henry E. Huntington Library, San Marino, California; San Francisco History Room and Archives, San Francisco Public Library; The Society of California Pioneers, San Francisco; the California State Library, Sacramento; Marin County Historical Society, San Rafael; The New York Historical Society, New York; The Georgia Historical Society, Savannah; the California Historical Society, San Francisco; The National Archives, Washington, D.C.; The Sausalito Historical Society; the Stanford University Library, Palo Alto, California; United States Treasury Department, Division of Alcohol, Tobacco and Firearms, San Francisco; the Wells Fargo Bank History Department; the San Francisco Mint; State of California, State Lands Commission, Sacramento; Presidio Army Museum, Presidio of San Francisco; California Academy of Sciences, San Francisco; Ken Baulm, Engineer, Harding, Lawson Associates, Navato.

The historical research presented in this research design was made possible in part by a grant from the Sourisseau Academy for California State and Local History at San Jose State University, California, and through partial funding by the Golden Gate National Recreation Area, National Park Service.



I. BACKGROUND INFORMATION

A. THE SITE

Archaeological site 4-MRN-506H, which represents the remains of the steamship Tennessee, is located on the Marin County coastline at Tennessee Cove, some four miles north of the Golden Gate. The site is currently under the jurisdiction of two government agencies, the State of California, State Lands Commission, and the United States Department of the Interior, National Park Service, as the Tennessee Valley Unit of the Golden Gate National Recreation Area.

Jurisdiction for those portions of the site below the mean high tide line rests with the State of California, while jurisdiction for those portions above mean high tide rests with the National Park Service. The site, which is registered with the State of California Archaeological Sites Survey as 4-MRN-506H, was nominated to the National Register of Historic Places by the National Park Service in early 1981 and was entered on the National Register on April 15, 1981. Therefore, all proposed actions which may have an effect on the resource must be in accordance with Federal Historic laws and guidelines as specified in the Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, Executive Order 11593, the Archaeological and Historic Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, and the National Historic Preservation Act of 1980. All National Park Service internal policies and guidelines as specified in NPS-28, Cultural Resource Management, also apply. For all those portions of the site below mean high tide, the guidelines specified in the California Administrative Code, Title 2, and the California Environmental Quality Act of 1970 also apply.

B. SITE HISTORY

The area of site 4-MRN-506H does not appear to have been occupied during Prehistoric times by the native american peoples of Marin County. These people, the Uimen, were known to have heavily occupied the Marin County shoreline bordering San Francisco Bay, but an archaeological survey of the Tennessee Valley area in 1978 did not locate any prehistoric archaeological sites in Tennessee Valley. (King 1979:16) The closest known prehistoric site; 4-MRN-6, is located a few miles to the east at the entrance to Tennessee Valley.

The land was originally part of the Mexican landgrant of Rancho Sausalito, which was granted to William Antonio Richardson by the Mexican government of California on February 11, 1838. Richardson, a former British subject, had arrived in California in 1822, remaining to marry into a prominent local family and become a Mexican citizen. As the first Captain of the Port of San Francisco, Richardson's headquarters for his official duties and his ranch activities were located on the bayshore at the site of the present town of Sausalito. Richardson's lands, which were later surveyed at 19,571 acres, encompassed much of the Marin peninsula and included Tennessee Valley and Tennessee Cove. Utilizing the land as a "sitio de ganado mayor" or cattle ranch under the provisions of the grant, Richardson remained the owner well into the 1850s; Richardson and some of his employees were the first local citizens to respond to the wreck of the Tennessee.

During the Mexican period (1822-1846), Tennessee Valley was known as Elk Valley, supposedly for the thousands of elk that wandered through the valley and the surrounding countryside, providing lard and hides for the local rancheros, who organized large hunting expeditions. (Lauff 1916) The expeditions were largely successful, and after 1850 only huge piles of moldering bones remained to mark the passing of the elk herds. The small beach and cove at the end of the valley were apparently not named until the American period, when they were referred to as Indian Cove for unknown reasons. As a result of two maritime disasters during the Gold Rush the name of the beach was changed twice, the first being for the schooner Fourth of July in 1849 (Munro-Fraser 1880) and the second being for the ship Tagus in August of 1851. (Alta California, August 5, 1851). At various times the cove was called "Potatoe Cove," probably for nearby Potato Patch Shoal, which allegedly received its name from overturned boatloads of the staple which could be seen floating in the water during the Gold Rush years. The wreck of the S.S. Tennessee in the cove on March 6, 1853 gave it a lasting name, Tennessee Cove, which was confirmed by the United States Coast and Geodetic Survey in 1855 and henceforth appeared on all charts and maps. (Gudde 1969:335) The name of the Valley changed from Elk Valley intermittently between 1873 and 1945, with usage of the name Tennessee Valley increasing in the twentieth century.

The original owner, Richardson, began to experience financial problems and was losing his lands through indebtedness in 1858 when he turned them over to Samuel Throckmorton, who ironically had come to California in 1850 on board the S.S. Tennessee. Under Throckmorton's administration the ranch changed from a large beef cattle ranch to a series of smaller dairy ranches that Throckmorton leased and eventually sold to individual farmers and ranchers. (Toogood 1980) After 1900, the owner of the Tennessee Valley was Italian-Swiss rancher and San Francisco businessman Antoine Borel, whose ownership would continue until 1937.

Meanwhile, the United States Army, who had acquired much of the land south of Tennessee Valley from Throckmorton and his successors, began to eye Tennessee Cove and Tennessee Valley as prime locations for seacoast defense installations. A small 5.5 acre parcel of land near the Cove was purchased from Borel in 1914, followed in 1937 with the entire Valley and Cove being acquired for an extension of the newly established Fort Cronkhite Military Reservation. (Lewis 1965:201-202) During the Second World War Tennessee Cove became the site of a spotting station and a cable relay hut for underwater mines in the shipping channels north of the Golden Gate. A huge cable was partially buried and covered with concrete sacks, running through the middle of the beach to an offshore location.

Infrequent public use of the beach for picnics had probably started in the early twentieth century. With the advent of war, however, and with armed sentries patrolling the beach and valley, the practice was stopped until the 1950s, when the beach, which had been released from the Fort Cronkhite Military Reservation after 1945 to once again become private land under the ownership of San Francisco stockbroker Dean Witter, was sold to the State of California. Under Witter's ownership, one major change had been made to the valley; in 1957, an earth and stone dam was built across Tennessee Creek, creating a large stockpond about five hundred yards east of the beach.

As a unit of the Marin Headlands State Park, Tennessee Valley and the beach were subject to infrequent public use due to difficult access. However, in 1976 the land was deeded to the National Park Service to become part of the Golden Gate National Recreation Area which had, by 1980, acquired much of Richardson's former lands in

Marin County as part of a massive 50,000 acre park. (Book of Deeds 3194:416) In 1980, the Golden Gate National Recreation Area was the most visited unit in the National Park system, with Tennessee Valley and beach being popular areas with high visitation.

C. PREVIOUS INVESTIGATION

In 1965, San Francisco Maritime Museum Curator Harlan Soeten, with the aid of a local Boy Scout troop, cleared beach sand away from a partially exposed metal object said to be an anchor from the S.S. Tennessee. The piece, which was drawn and photographed by Soeten, was found to be a part of the ship's sidelever engine known as a crosstail.¹ Unfortunately, no further work was done by Soeten since the site was then on private land.

In August of 1980, Park Historian James Delgado and Park Archaeologist Martin Mayer of the Golden Gate National Recreation Area visited Tennessee Cove in an attempt to relocate the crosstail observed by Soeten in 1965. The piece was relocated, photographed, and measured drawings prepared. This work, along with some historical research, led to the nomination of the site to the National Register of Historic Places since it appeared that many additional remains of the Tennessee were likely to be present. This potential was verified by Mayer, Delgado and local archaeologist Robert Bennett with a limited magnetic survey along the beach. At the same time, working independently, local divers David and Steven Buller, also interested in the Tennessee, performed a limited survey of the underwater portion of the site with a hand-held proton magnetometer, locating some wreckage deposits immediately offshore. No excavation of the site was performed by either group at that time.

Severe beach erosion in March of 1981 exposed several hundred feet of the rocky level of the beach with approximately four hundred metal objects. Since many of the objects were threatened by exposure and visitor impact, the location of each object was plotted, cataloged, and the objects removed. After cleaning and analysis, it was determined that approximately forty percent were associated with the S.S. Tennessee or a vessel of her vintage; the remainder were associated with modern debris brought in as flotsam or dropped on the beach by visitors. All of these materials were cataloged and retained for future study.

The erosion of the beach also uncovered two additional items: a large metal shaft which was determined to be a paddlewheel shaft referred to in 1880 as being visible in the surf line and a smaller piece of metal almost completely buried in the sand next to the shaft. Later erosion on the beach during a winter storm in March 1981 uncovered a 1788 Spanish silver coin between rocks at a level slightly lower than that of the metal objects recovered earlier. With the assistance of student archaeologists from the College of Marin, who had assisted earlier in the survey and retrieval of the other objects, five two-meter square sample units were hand-excavated to a depth of 50 centimeters in this area to evaluate its sensitivity. Several hundred brass spikes, copper nails, and fragments of copper sheathing were recovered as part of a micro-constituent sample. No further work

¹ This identification was confirmed in 1981 by National Maritime Museum steam engine consultant William P. Sawyer utilizing a set of the Tennessee's engine plans.

has been done since further storms have once again buried the archaeologically sensitive rock and gravel layer under the beach sand. The limited work done to date clearly indicates the high potential of the site for archaeological material associated with the wreck of the S.S. Tennessee.

D. COMPLIANCE

Some of the archaeological remains of the S.S. Tennessee lie on Federal land, and the proposed archaeological examination and survey of the remains would be an undertaking done under the legal guidelines of the National Park Service. All archaeological work done on a site on Federal land must be in compliance with the Federal historical and archaeological laws and guidelines specified in the site description. These guidelines are particularly relevant since the site is further protected by law as a National Register property. Under recent guidelines enacted by the Advisory Council for Historic Preservation, the National Park Service, and other Federal agencies, an "Assessment of Actions Having An Effect on Cultural Resources" for the documentation of the resources at 4-MRN-506H was prepared by Cultural Resource Specialist and Park Archaeologist Martin Mayer of the Golden Gate National Recreation Area. The document identifies a magnetic survey of the portions of the site above and below mean high tide and also calls for limited excavation to verify the extent and identity of sub-surface deposits encountered in the survey. The approved document, which provides compliance with the various Federal laws and guidelines specified in this research design, is sufficient for all phases and processes of work as outlined in this document and a copy is attached to this research design. Should at any time additional compliance be deemed necessary by the National Park Service, it shall be sought through consultation with the staff of the Office of the State Historic Preservation Officer in Sacramento and with the staff of the Advisory Council for Historic Preservation.

A major portion of the site is located below the mean high tide mark, which is under the jurisdiction of the State of California. Underwater archaeological research of the Tennessee, which is technically "abandoned" property, does not fall under the category of salvage under the provisions of the California Administrative Code, Title 2, and a permit for salvage activity is not required by the State Lands Commission. Since the proposed documentation of 4-MRN-506H does not contemplate the salvage of artifacts from the wreck for a commercial purpose, a limited amount of small objects of no commercial value being raised for the purpose of controlled scientific testing and conservation study, such a permit is not considered as likely to be required.

II. HISTORICAL BACKGROUND

A. THE S.S. TENNESSEE

The discovery of gold in California in January of 1848 sparked "the greatest mass migration of humanity since the Crusades," the California Gold Rush. Within months of the discovery, thousands of eager gold seekers had booked passage on hundreds of vessels in their haste to get to San Francisco, the gateway to the gold fields. Many of these ships were sailing vessels like the whaler Niantic, whose bones were recently discovered beneath the San Francisco streets that now cover the long-buried waterfront of 1849. (Delgado 1979) The ill-planned haste and the glut of sailing ships in 1849 soon gave way to a more organized exodus via steamship. While many of the initial "forty-niners" came by sail, their numbers were overwhelmed by thousands who came by steam via the Panama Route. A limited number of steamships, pioneers of a new technology on the west coast, were the workhorses of the Gold Rush, carrying tons of mail, cargo and gold along with passengers. Unfortunately, none of these important vessels exist today, victims of disaster, old-age, and breaking up for "salvage." The only known remains consist of a few unexplored and hence unknown archaeological resources. Through the detailed exploration, documentation, and historical research of one of these sites, that of the wreck of the S.S. Tennessee, more can be learned about the particular role and the characteristics of one of the more important Gold Rush steamships. The S.S. Tennessee was a product of the New York shipyard of master builder William Henry Webb, one of the nation's foremost marine architects, peer and equal of famed clipper ship builder Donald McKay, and the founder of the Webb Institute of Naval Architecture. Webb's yard turned out 133 sail and steam vessels between 1840 and 1865, "the greatest tonnage to come from a single yard in the period." (Dayton 1925:389) Webb produced some of America's most famous clipper ships, naval vessels, and merchant steam vessels. His fame as a shipbuilder doubtless inspired Samuel L. Mitchell, a prominent capitalist, to commission the Tennessee and her sister ship, the Cherokee, for Mitchell's Savannah Steam Navigation Company, which proposed a steamship line to connect Savannah and New York. Prior to this time,

Communication with Savannah, Ga., before the service by steamships to coastwise cities was by sailing packets, but in the fall of 1848 the New York and Savannah S.S. Co.-- Mitchell's line--began running the "Cherokee" from New York. The "Cherokee's" first trip was made September 13th, and the "Tennessee's" her consort, early in the spring of the next year. (Morrison 196:448)

As indicated, the Cherokee was the first completed, being launched in June of 1848, going into operation while the Tennessee was being constructed. The work on the Tennessee was soon finished, and on October 25, 1848, the New York Daily Tribune announced her impending launch:

LAUNCH OF ANOTHER STEAMSHIP

The second steamer of the New York and Savannah line will be launched this morning at 9 o'clock, from the yard of Wm. H. Webb, foot of sixth-st. East River. Her name is the Tennessee, and in connection with the Cherokee, already in successful operation, will form a weekly line between the two cities.

The launch proceeded without delay, and on October 27, the Daily Tribune reported

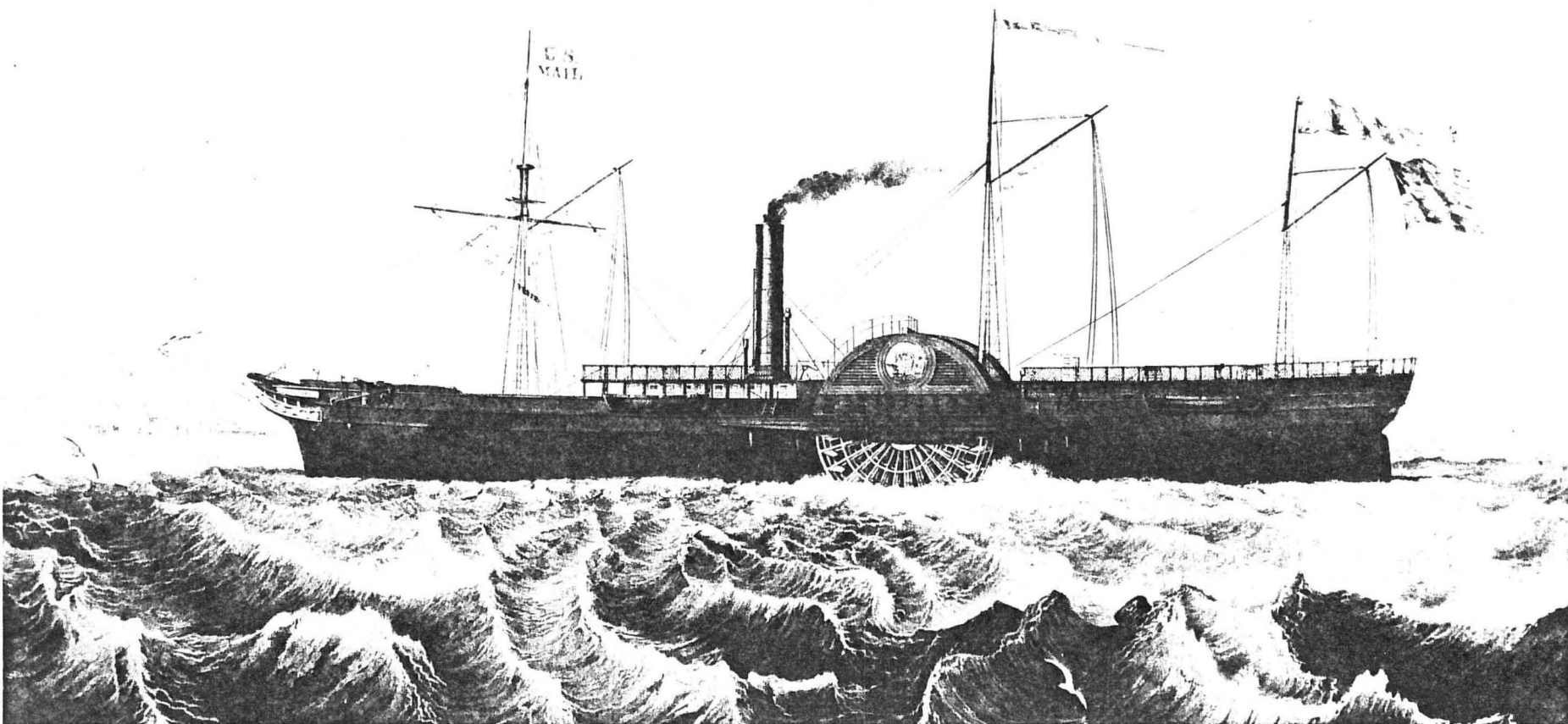
THE STEAMSHIP TENNESSEE was launched on Wednesday morning, sliding from her ways in a beautiful style, amid the enthusiastic cheers of a large number of spectators. She is regarded as a specimen of superior naval architecture, especially as regards strength and adaptation to unite speed with safety in rough seas...Her dimensions are: length, 210 feet; breadth, 35 feet; hold, 22 feet; wheel, 31 feet in diameter; cylinder, 75 inches, 8 feet stroke; steam 15 inches. Her accommodations are for two hundred passengers. In model she has a sharp prow, full breadth and flat bottom, drawing, when loaded, about eleven feet. This construction preserves a nearer equality of draft throughout the voyage.

The design of the ship, as noted above by the New York Daily Tribune commanded respect:

Although a clipper bow with headrails and trail boards still indicates the Tennessee's sailing-ship ancestry, the rest of the lines do not. The packet ship's flat transom has vanished and has been replaced by a counter stern. One unique feature introduced by Webb was the completely flat bottom, a great asset for a steamship, for it allowed the boilers and engines to be mounted low in the hull and permitted the shallowest possible draft, a particularly desirable feature when most American harbors were protected by natural sand bars and ships had to await high tides and favorable sea conditions before they could enter. (Ridgely-Nevitt 1981:111)

Following her launch, the Tennessee was towed down the East River to the Novelty Iron Works of Stillman, Allen, and Company, where her huge cast iron side-lever engine was installed along with her other machinery. She was fitted out and ready for sea in early 1849. The first voyage of the Tennessee apparently proceeded without any problems; Horatio Allen, co-owner of the Novelty Iron Works, was on board with his family, probably to assist should any problems with the engines arise during the trip. (New York Daily Tribune, March 22, 1849) Clearing New York harbor on March 22, 1849, with 55 passengers, (only six of them in steerage) the Tennessee made a quick passage to Savannah and back, and settled into an orderly pattern of weekly operation opposite the Cherokee.

The California gold discovery soon disrupted the ordinary patterns of shipping as all available vessels were needed in the mad rush to the "diggings." The Pacific Mail Steamship Company, chartered in 1847 to carry the United States Mail and passengers to America's new territories on the Pacific, joined the Gold Rush with fervor, providing, at the time, the only reliable transportation between Panama and San Francisco. Panama was the first major stop for passengers bound for California who did not wish to take a prolonged and often rough voyage around Cape Horn. Many American fortune hunters booked passage to Chagres, on the Caribbean side of Panama and then made their way over the Isthmus to the Pacific side. Passage over the Isthmus was difficult, there being no established route. Part of the trip was made by boat, up the Chagres River:



The S.S. Tennessee, 1849. This lithograph shows the Tennessee after her 1849 rebuilding and is the only known representation of the ship under the Pacific Mail Steamship Company flag. Courtesy of the National Maritime Museum, San Francisco.

The river was broad, and its banks low and covered with an impenetrable jungle. As night came on the stillness and darkness of that tropical wilderness were very impressive. The boatmen chanted monotonous songs to the dip of the oars, and the wild beasts on the shore responded with savage howls. (Pratt 1891:904)

After progressing up the river for several miles, the travelers would have to switch to mule trails, which then proceeded to Panama City:

With our mules in a string we plunged at once into a narrow, rocky path in the forest, where palm-trees and creepers shut the light out overhead--splashing through gurgling, muddy streams, that concealed loose and treacherous stones--stumbling over fallen trees that lay across our road--burying ourselves to the mules' girths in filthy swamps, where on either side dead and putrid mules were lying-amidst lightening, thunder, and incessant rain, we went at a foot-pace on the road to Panama. (Marryat 1855:18)

Not all trips across the Isthmus were necessarily horrible, but the passage was a difficult one. Nevertheless, the Panama Route soon became the major route of travel to California, with much energy and labor expended to make the way easier and faster.

Once in Panama City, the gold seekers would await the next ship to San Francisco. To accomodate the heavy traffic, the Panama Mail Steamship Company, which by 1849 had three steamers on the Panama Route, began to enlarge their fleet, the S.S. Tennessee joining Pacific Mail in October of 1849.

This fine steamer, which has been running successfully between this port and Savannah in S.L. Mitchell & Co.'s line, has been bought for \$200,000 by Messrs. Howland & Aspinwall for their Pacific line of Mail Steamers between Panama and San Francisco. This will make four first-class steamers in that line. The Tennessee is of 1,200 tons, a little larger than the other steamers of the Howland and Aspinwall line, and being in every respect a credit to American builders and mechanics, will extend their reputation in the Pacific. She cost originally about \$175,000. (New York Daily Tribune, October 10, 1849)

The Tennessee was overhauled and partially rebuilt for her new owners by William H. Webb, her builder, with her accomodations being enlarged from two hundred to five hundred and fifty. (Heyl 1953:417) The new construction was major in scope:

...an extra deck was added over the original houses from just aft of the forecastle all the way to the stern. Aft the wheels, the sides were extended up to the new deck. The pilot house disappeared in the process. While providing for three times as many passengers, the alterations changed the Tennessee from a handsome ship into an ugly one. (Ridgely-Nevitt 1981:113)

Below decks, larger coal bunkers were installed, as were additional water tanks, since on her new route the Tennessee would be sailing on prolonged voyages. (Ridgely-Nevitt 1981:113) The larger coal bunkers were a necessity; The Tennessee's boilers consumed 2400 pounds of Anthracite Coal per hour. (Bartol 1851: 40) Since the Tennessee would be carrying the United States mail for the Pacific Mail Steamship Company under the terms of their contract with the United States government, the ship was inspected by three naval officers, who investigated her fitness to fulfill the specifications of the contract. Reporting to the Secretary of the Navy on November 19, 1849, the three-man board stated

we have inspected the steamer "Tennessee," belonging to the Pacific Mail Company....The "Tennessee" has been constructed of mixed unseasoned timber, put together in the usual manner; she has no extraordinary fastenings, and may be considered, in point of strength, equal to the other steamers of the Pacific Mail Company, excepting only that she is not diagonally trussed. For fleetness she is supposed to be superior to the other vessels; and for convenience of application to war purposes, she has equal advantages....She has one side-lever engine, with two flue-boilers, made at the "Novelty Iron Works;" the engine having the nominal power of about 240 horses, estimated by the English rule, which may be considered equal to 400 horses' operative power, at moderate pressure. She has iron coal bunkers, and will carry 450 tons of coal; her alleged daily consumption being about 20 tons. She also has iron tanks for a supply of water equal to ten thousand gallons. When launched she drew seven feet of water, and with all her machinery on board her draught is ten feet and six inches. She is lightly rigged, and somewhat in the manner of the other vessels of the same company. (Senate Executive Documents, 33rd Congress, 1st Session, No. 50 1852:181)

The satisfactory findings of the Navy inspectors were duly ruled upon and in September of 1850, some seven months after the Tennessee's arrival in the Pacific, the Tennessee was accepted by the Navy and the Postmaster General for carrying the United States mail.

Advertised as being ready to sail around the Horn in early December of 1849, the Tennessee booked a small complement of passengers and left New York on December 6th under the command of Captain George Cole. Bound for Panama and San Francisco via Rio de Janeiro, Valparaiso, "and other places on the southern continent," the Tennessee reached Rio after "an ordinary voyage, free from any unusual incident" according to the ship's surgeon, Dr. E. R. Chapin. After a fast passage of twenty-seven days, the Tennessee anchored at Rio for ten days, reprovisioning for the trip around Cape Horn. (Wienpahl 1978:129)

The trip around the Horn was particularly rough, with the Tennessee being forced to lie for a week in the Straits of Magellan to repair some damage. (Chapin 1874:1) Proceeding to Valparaiso behind schedule, the Tennessee again reprovisioned for ten days, arriving in Panama long overdue. Sailing into Panama Bay on March 12, 1850, the Tennessee was effusively greeted by the cheers of eager argonauts who had awaited her arrival:

This great leviathan of the Pacific came careening up in majestic style, towards the anchorage of the bay of Panama, and as she neared the place of mooring, the batture was lined with smiling countenances and sparkling eyes and stalwart arms, all ready to join in the loud huzza--hail, all hail; the welcome of the glorious ship, old Tennessee--and the chorus of that beautiful melody

"Away down in Tennessee, A li, e li, u li, e..." was instantly on the lips of the gratified concourse who were assembled to witness the ship's swanlike approach to the harbor! (Kemble 1943:39-40)

The enthusiastic reception of the Tennessee was a marked change of attitude for the stranded gold seekers who had waited for her. In a letter to the editors of the San Francisco Alta California, one bemused spectator reported

The tardy arrival of the Tennessee gave rise to some indignation meetings, but also, one laughable occurred. While the feeling was at its height, a meeting was being held in the plaza, sundry resolutions--having for their purport to take the "Panama" steamer, and go to your city without leave or license--were being passed, when a party came from the walls and said the Tennessee had just dropped her anchor. Immediately all thoughts of the Panama were done away with and indignation stock fell 100 per cent. Where before were to be seen nothing but frowns, now all were smiles, greeting passed between men who had met and passed fifty times a day with a mere nod, as would pass between intimate friends that had not met for years--or in other words, all before was night, now all was morning. (Alta California, April 16, 1850)

The Tennessee's characteristics were enthusiastically described by the local press, the Panama Echo of March 16, 1850 noting

The ship is fitted up in superior style. She is capable of accommodating 200 cabin, 350 steerage passengers. The vessel was built in New York about a year ago, and may now be fairly set down as the crack ship of the Pacific sea. Her arrival was met with demonstrations of joy, and we trust she will prove a valuable auxiliary in the California trade, in conveying passengers and freight....Capt. Cole, the commander of this steamer, we are told, is not only a gentleman by courtesy, but is one in the real sense of that term; and is, moreover, an experienced officer, well suited for his responsible post.

The Tennessee is now unloading, and replenishing her water casks, and will be ready to sail for San Francisco, next Thursday or Friday. She will have a rousing load of passengers, and we wish her god speed, and a prosperous voyage.

Before the Tennessee could set sail for San Francisco, the ship had to be made ready for the hundreds of passengers that would soon embark. Under the watchful eye of the officers, the vessel was first made ship-shape, for "you may depend on it, there is some work to do in a steamer, after a four month voyage. But I am a rare hand with a scrubbing brush, and with the help of twenty more, I think we will get the paint brightened up, and the decks cleared in a day or two more." So wrote a New York minister, James Rogers, who was stranded in Panama without money and worked his way north, like many other men, on the Tennessee. "They ship sailors, waiters, bakers, butchers, and cooks etc. on these various terms." (Vail 1960:274)

The Tennessee sailed from Panama City on March 23, arriving in San Francisco for the first time at noon on April 14, 1850. The excitement of the moment pervaded the entire ship, breaking even the strict discipline of the crew: "after we had cleared away breakfast, all discipline in the steward's department quickly relaxed when it was known that the entrance to the greatest harbor in the world was fully in view." (Vail 1960:276) The next day, the San Francisco Alta California, also caught up in the excitement, followed the lead of the Panama Echo by enthusiastically announcing the

"ARRIVAL OF THE TENNESSEE!"

The U.S. Pacific Mail Steamship, Tennessee, Capt. Cole, arrived yesterday morning from Panama, coming to anchor about 12 o'clock. Being Sunday, our citizens flocked to the various ports of debarkation and the harbor swarmed with small boats filled with living freight eager to board the new steamship and obtain intelligence from friends far away. The Tennessee left Panama on the evening of the 23 inst., and has consequently been twenty days making the trip; this however is attributed to the fact of her coal being of an inferior quality, as she has given evidence of being a very fast sailor. Her qualities as a sea boat, we heard highly spoken of by passengers.

Thus the Tennessee was inaugurated into the hectic pace of the Panama Route. Soon, with the other Pacific Mail steamers, the Tennessee commenced a new sailing schedule and a San Francisco tradition on July 15, 1850, when she sailed for Panama. Rather than sailing on an irregular schedule, new rules called for departures on the first and fifteenth of each month, providing a regular schedule. All outstanding bills and debts due at the end of the month, therefore, had to be posted and on the Tennessee and her sister ships on the 15th in order to reach parent firms and banks back east. The mad rush between San Francisco businesses, banks, and the steamship office became known as "steamer day," and even after steamships had long passed into decline, many San Francisco businesses still observed "steamer day" bill payments and postings.

The Tennessee, as a vessel in the Pacific Mail fleet, did carry the United States mail to and from Panama. One voyage which terminated at San Francisco on July 20, 1851, saw the Tennessee land nearly eight tons of mail, the "largest among ever brought to San Francisco by one vessel." (Rasmussen 1966:177) The arrival of the mail in San Francisco was always the focus of much attention; in fact, when the Tennessee wrecked in 1853, the Alta California took great pains to announce that the mail had been safely landed in the city and through the diligent effort of the postmaster would soon be ready for distribution.

Being a fast sailor, and like her sister vessels on the Pacific Mail line, being a first-class ocean liner, the Tennessee commanded high rates of passage. A trip to Panama might cost \$300 for a stateroom, \$175 for the open cabin, and \$100 for steerage. Rates of passage varied; often times passengers would pay for the entire trip from coast to coast, leading a few naive persons to imagine that Pacific Mail would transport them across the Isthmus. In addition to the Panama passage, Pacific Mail ships also stopped to take on and leave off passengers at Monterey, San Diego, Acapulco, and San Blas, Mexico; accordingly the fares were much less. For the high rates, the passengers supposedly received good service and good food, a rule that usually was applied though there were some exceptions. Historian Robert O'Brien, perusing the Tennessee's menu for November 23, 1851 almost a century later, pitied the diners, since

The carelessness with which it had been scrawled was in itself an oration on the fate in store for them. "Salmon," the menu said, under FISH. How prepared? Broiled? Baked? The lack of detail clearly indicated "It doesn't really matter." Under BROILED the menu offered "Broiled Mutton Caper Sa..." and "Cold Ham and Tom..." whose "Sauce" and "Tomatoes" trailed off and lost themselves in the marginal decoration. Likewise, a hand plainly guided by long familiarity and distaste hastily scribbled the rest, denying hope down to last stale nut, the last tasteless fig, the last leathery "raison." (O'Brien 1950:2)

For the most part, however, the food was good, one menu offering

vegetable soup, Pickle salmon, Corned Beef, Ham Pork, Fricasee Chicken Curry & Rice, Bake (sic) macaroni, Stewed Kidney, Pork Chops Tomatoes sause (sic), Fowls, Beef, Pork, Heart, Pigs Head, Potatoes, Beans, Corn, Sweet Potatoes, Beets, Boiled Rice Pudding, Rhubarb Pies, Cherries Tarts (sic), Pine Apples, Bananas, Prunes, Almonds.
(Menu for December 21, 1850)

One passenger, discussing the cuisine, noted "Well can they afford us the luxuries of the table, they are well paid, and I don't complain of our living, it is good enough and too good." (Pierce 1850) Pacific Mail went to great expense to provide a diverse diet for the steamers, and account books for the Tennessee note the various and sundry sources of supply. On one occasion, the accounts refer to duck and other game supplied by professional "market" hunters at a cost of \$464.50, terrapins caught by the schooner Providence, \$126.90, fruits and wines from a local farmer, \$142.00, and \$96.00 worth of brandy from Douglass and Company, "Importers and Dealers in Wines, Liquors, Cigars, Etc." in San Francisco. (Parker 1852:13) Water for the ship was supplied by San Francisco's many water dealers, who sold the precious liquid by the bucket in a city plagued by a lack of fresh water.

Prices were high in the gold-inflated market, and Pacific Mail had to pay the exorbitant rates. On one occasion, Pacific Mail purser Andrew Bell Forbes, purchasing provisions for his ship, the S.S. California, found it difficult to locate everything he needed and was assisted by a local merchant Bancroft, who was a frequent supplier for Pacific Mail ships. Bancroft took Forbes to a nearby store where he knew they could locate the necessary supplies:

On entering the store they found a large jar containing about one hundred pounds of Zante currants and Mr. Forbes remarked to Mr. Bancroft that this fruit was exactly what he wanted and he must have some of it. On inquiry, he was told that the currants were a dollar per pound and he said he would take the whole of them, whereupon Mr. Bancroft was so displeased with what he considered Mr. Forbes' extravagance that he would not stay with him any longer, but went home in disgust and left him to pursue his purchase of steamer stores unaided. In those days a man was obliged to pay whatever price was asked, or otherwise leave the goods, as in many cases it was almost a favor for the vendor to let him have them.... (Forbes 1886:3)

The high prices of the Gold Rush certainly made the provisioning of the steamers difficult.

Other expenses included the almost monthly replacement of crockery and tinware to fill in for those "borrowed" or broken on the last voyage. Even something as simple as straw for bedding was a major expense, some 7520 pounds of straw being needed to fill about half of the Tennessee's mattresses. New straw was added every other month, with frequent changes of linen too worn or soiled to be used again. This special care and expense was not overlooked by the passengers, however, and despite some complaints, the Tennessee and her sister ships became the favorite vessels on the Panama Route.

In her holds the Tennessee carried thousands of tons of cargo ranging from furniture, "cases of machinery," merchandise for San Francisco merchants, and the baggage of her passengers. (Rassnussen 1966, 1967) In addition, she also carried thousands of passengers, many of whom became active participants in the creation of the new state; famous passengers included James King of William, San Francisco newspaper editor and the "martyr" whose death helped spark the first Committee of Vigilance; William Tell Coleman, the San Francisco merchant who lead both Committees of Vigilance; James Stuart, the first victim of the vigilantes; Thomas Butler King, Collector of the Port of San Francisco; Josiah Belden, member of the first overland party to California in 1841, prominent early merchant, and Mayor of San Jose; Frederick F. Low, Civil War Governor of California and later President Grant's ambassador to China; and Leonidas Haskell, prominent California abolitionist and friend of Senator David Broderick, at whose fatal duel Haskell stood as second and brought Broderick back to his home to die. Besides the famous, many of the Tennessee's lesser known passengers stayed to form the backbone of farmers, laborers, merchants, artisans, and craftsmen who created a strong California economy after the end of the Gold Rush.

Other "passengers" on the Tennessee included the meat "on hoof" that fed the crew and passengers. The chickens, cattle, and hogs needed for the menu were kept alive and hence "fresh" until they were needed, then being slaughtered and served. One amusing anecdote has survived concerning the Tennessee's provisioning for her last voyage to Panama:

In 1853, a stir was created on the streets of San Francisco when Burnham and Marnn, butchers, decorated the cattle which had been purchased for the Tennessee and marched them to the ship through the streets to the lively music of fife and drum. The Pacific Mail was accused of doing this as an advertisement, but the butchers claimed the idea and execution as their own. (Kemble 1943:161)

Like any other vessel the Tennessee had her fair share of near-misses and "scrapes." Her accounts list several dozen minor repairs and a few major ones, such as a new shaft for the engine in September of 1852. The worst damage occurred in early 1851, when the Tennessee, northbound on San Francisco Bay for the Pacific Mail yard at Benicia, collided with the Pacific Mail Steamship Northerner in a heavy fog:

The steamship Northerner, on her way down, and the steamship Tennessee, on her way up, came into contact. The Northerner had one of her wheelhouses carried away and the Tennessee had her bows stove in. At a quarter past 8 o'clock, when the Senator passed them they were lying in close contact, and it was understood that both were badly crippled. (*Alta California*, January 14, 1851)

Fortunately, both ships remained afloat and were soon repaired at Benicia. Just four months later, the Tennessee, while entering the harbor at San Blas, Mexico, "was so unfortunate as to strike a rock....She passed over it, much to the relief and satisfaction of all on board, without sustaining serious perceptible injury." (*Alta California*, May 20, 1851). The Tennessee would finally meet her end on March 6, 1853, when she ran aground in Marin County while trying to make the Golden Gate in a heavy fog.

Arriving in Panama on February 20, 1853, the Tennessee had reprovisioned and recoaled for the return trip, embarking approximately five hundred and thirty six passengers. Superstitious persons could have made something of a bad omen out of the fact that two passengers, while embarking, fell off the crowded gangplank into the shark-infested waters of Panama Bay, only to be rescued by Chief Mate Richard Dowling, who jumped overboard and held them up until help arrived. More than likely, though, the only thoughts were of impatient urgency to get to California--and the gold. The voyage north was like many other trips. The passengers roamed the decks, getting in the way of the crew. Meals were regularly served, and despite the Tennessee's reputation of being a good feeder, passenger Elizabeth Ashton thought she detected fragments of the ship's rope in her meal. (Gardiner 1958:16) There was also illness on board, brought on by passengers who had caught yellow fever while waiting for the ship in Panama. As with other voyages, the fever began to take a toll. Dealing with the fever and the resultant deaths had never become commonplace with the ship's surgeon, Dr. Alex McNaughton. Having successfully quelled outbreaks of the fever on board Tennessee in the past, McNaughton had eventually fallen into despair with each repetition of sickness and death. In January of 1853, McNaughton, facing yet another outbreak on board, and "losing his first cases, and seeing the terror spread around him, soon became demoralized, and losing sleep, resorted to stimulants, and finally arrived at such a condition that his brother officers felt it necessary to put him in irons. He was, in fact, a maniac." (Coleman 1878:1) Through the efforts of several passengers, the spread of the disease was halted and many of the stricken recovered. Dr. McNaughton also apparently recovered, for the next month he was back on board the Tennessee for her last voyage. Once again, though, the fever struck, and McNaughton snapped. Halfway through the voyage to San Francisco he slit his throat. (Stocking 1891:355) Fortunately, he was discovered and survived and was taken off the wrecked ship at the journey's end, once again in chains. With yet another "bad omen" to her credit, the Tennessee steamed north to San Francisco--and to her doom. Arriving at the Golden Gate on the evening of March 5th, the ship stood off to await the morning before entering the harbor. The proximity of the Gold Rush city made just as much of an impression on this last voyage as it had on the first:

We all went to bed prepared to get up early, and as soon as it was light we all jumped up and got ready as quick as we could, and everybody put on his best clothes to go ashore, you know (the ladies were planning to go to Church, as it was Sunday morning, and dressed for making their appearance there) and we hurried up on deck to look around, and see the Gate. (Stocking 1891:352)

The morning brought a thick fog, which almost completely obscured the shoreline. Captain Mellus, confident of his position, began to slowly work the ship towards the Golden Gate. Meanwhile, some of the passengers, confident of a delay, made their way below deck to start on breakfast. The strong current of the gate caught the ship, and unknown to the Captain, slowly began to swing the Tennessee past the harbor entrance and along the rocky shoreline of the Marin County coast. The first inkling of disaster came a little after nine o'clock, when a steerage passenger who had been standing at the bow ran towards the wheelhouse, shouting that he could see breakers ahead. By this time Mellus could hear the crashing waves, and as the fog suddenly lifted, the narrow confines of a sand beach could be seen; behind the ship, and surrounding the Tennessee, were the jagged spires of bare rock. At that moment, the ship struck. Below decks, passenger Fred Stocking had just sat down to breakfast with a friend next to the overweight nurse of another friend's children:

We sat down near her and called for something to eat, when there came an awful crash of the steamer. Everybody knew instantly that we'd struck. Everything went off the table in a heap, and this nurse, she went over, too, baby and all. She picked up the baby and got to her feet, and then she made a jump for my chum and flung her arms round his neck, and yelled, "O, save me, save me! I'm going to be drowned." "O, no," says he, "you won't drown. You're too fat, you'll float." (Stocking 1891:354)

The Tennessee, grinding into the sand of the beach, heeled sharply offshore as each wave pounded her closer to shore and deeper into the sand. The decks were filled with milling passengers, many of whom were crying and screaming. Some began to pray as the rocking of the ship began incessantly tolling the ship's bell. "The women took it for the toll of doom." (Stocking 1891:355) In the midst of the confusion, a few crew members and passengers sprang into action; Chief Mate Dowling, tying a line to his waist, leapt overboard and struggled through the surf, fastening the rope to a large rock to allow for the rigging of a breeches buoy. Following his example, steerage passenger Johann Hein also jumped overboard, doubtless followed by others, and swam through the breakers to the narrow beach. (Hein 1902:1 and Gilchrist 1981) While anxious passenger Elizabeth Ashton began pushing her fellow travellers into the breeches buoy, passenger Thomas Gihon, the burly agent for Adams and Company, neglected his responsibility for fourteen chests of gold and began to usher a group of women and children to one of the ship's boats. Using his pistol to keep back an anxious crowd of men who tried to storm the boat, Gihon made trip after trip, finally landing the women and children. Wearily rowing back to the ship, he loaded the express under his charge and left the Tennessee for the last time.

Fortunately, calm heads prevailed and all of the male passengers were safely landed, as was the baggage of many passengers. They were followed by the crew, with mattresses, pillows, and sails for pitching camp on the uninhabited coast for the night, using the sails as tents.

It was foggy, cold weather, and hundreds of people crowded on the little beach, and not enough tents to go around, and a great many of the steerage passengers got guides from those who had been in the country before, and started off across the mountains to walk to Sausalito. The balance of them stayed with us and got tents. It came on night, and the officers left the wreck and came on shore....The passengers had built fires along the beach from the wreckage, and some of them and the officers were standing close around these to keep warm. (Stocking 1891:355)

Among those who elected to hike overland to Sausalito was sixty-three year old Peter Ogden, one of the Hudson's Bay Company's chief executives on the Pacific coast, acting British agent in the negotiations with the United States over the Oregon territory, and Oregon's governor. His breakfast disturbed when the Tennessee went aground, Ogden, after safely landing on the beach with his luggage, decided to press on for San Francisco.

He was, however, in a dilemma. He had several thousand dollars in gold coins in a locked valise. It was too heavy for him to carry to San Francisco Bay. Finally he unlocked his suitcase, put soiled clothing on top of the coins, and let a pair of old, half-worn shoes hang out in plain sight, hoping that anyone with thieving tendencies would believe that an unlocked case contained nothing of value. Ogden was right. When he returned to the camp, he found that the trunks had all been opened and rifled, "but the thieves had not touched his satchel, which lay on the ground just as he had left it." (Cline 1974:210)

Perhaps the pleasure of not losing his money persuaded Ogden to lead a group of passengers in petitioning Pacific Mail not to fire Captain Mellus.

On the morning of March 7th, help began to arrive, summoned by the passengers who had hiked to Sausalito. Captain William A. Richardson of Sausalito had alerted the Pacific Mail office in San Francisco, who dispatched the steam tugs Confidence and Goliah on the 7th, the Confidence to Richardson's landing in Sausalito, to pick up the stranded passengers, and the Goliah to the Tennessee to "get her off and bring up the ladies and others that are there." (Alta California, March 7, 1853) Meanwhile, the local papers described the wreck to their readers, many of them anxious to hear the fate of friends and family known to be aboard:

Steam was kept up until the distance was run by dead reckoning....Soon after, a rock was seen, which was supposed to be Mile Rock. The lead was kept going all the time, and gave soundings in six and seven fathoms water. Soon afterwards the land was near, which was taken to be south Head, and the steam was let on a little more. It was shortly discovered that land was not the Head, and at the same time a ledge of rocks

was seen immediately astern of the ship. To back her was impossible, as there was not enough room to turn in; but to acquire this room she was put slowly ahead towards the beach, when she took the bottom aft. The sea then swung her around; and she went broadside onto the beach....The ship now lies heeled off shore, which fact gives additional ground to hope that she will be gotten off. She is perfectly tight, and although her copper is much chafed and rubbed off there is every reason to suppose that no serious injury has thus far been sustained by her. (Alta California, March 7, 1853)

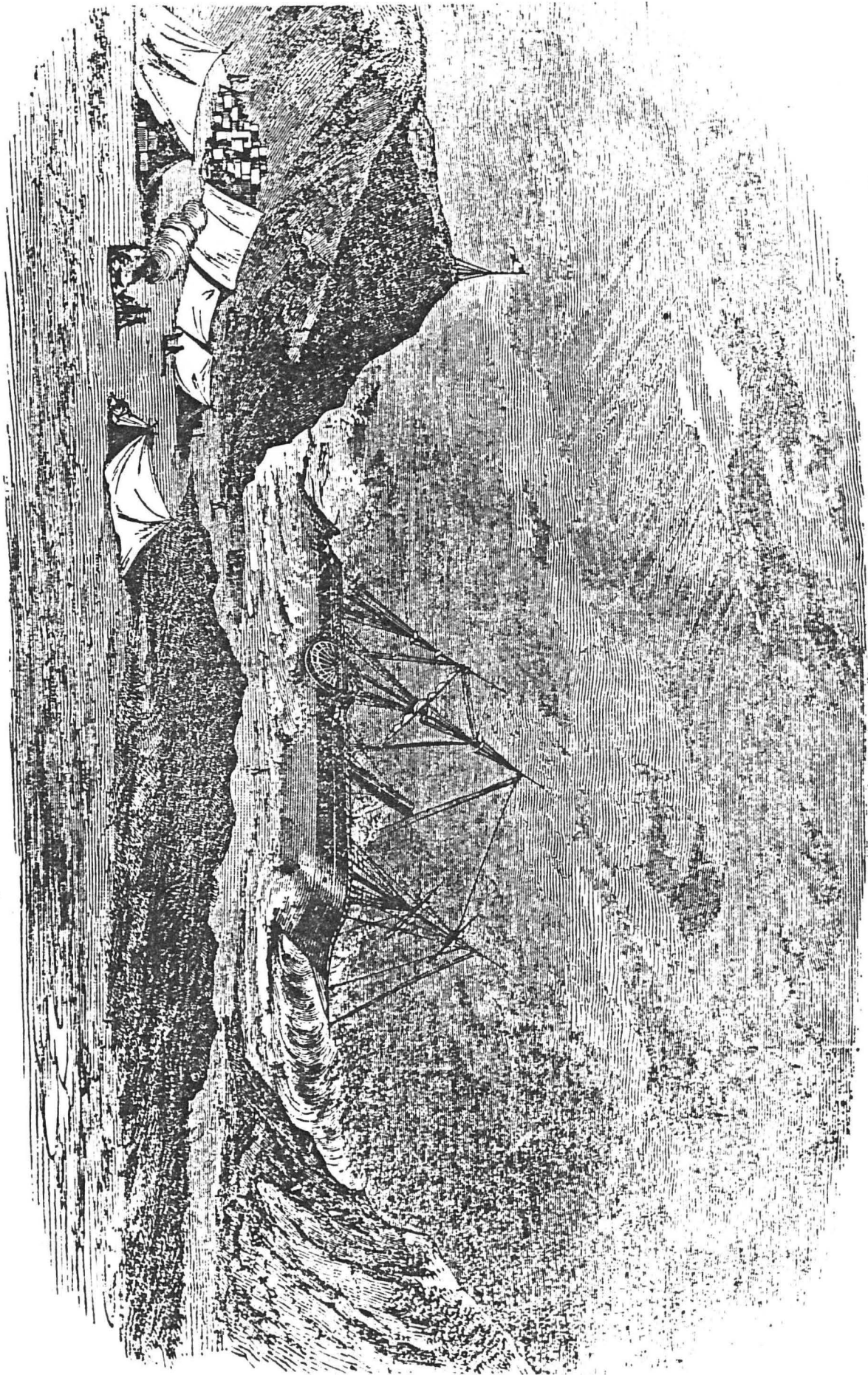
The Alta California, too optimistic, failed to take notice of the fact that the ship was being driven deeper into the sand with each hour of heavy surf pounding against the hull. Seams had begun to open, and the bottom of the ship was flooded. The Goliah, when she arrived, was unable to pull the Tennessee free of the beach, nearly wrecking herself in the heavy swell. Finally, the passengers, with their baggage and some of the mail, were taken aboard and the Goliah returned to San Francisco. The Goliah landed in the city at 2:00 p.m., having been preceded by the Confidence, with a load of 100 steerage passengers, the hour before.

The Goliah returned to the ship on the 8th, but as before, was unable to free the Tennessee. The sea had finally claimed the Tennessee, despite all efforts:

Steam was gotten upon her and the pumps were worked by engine, which freed her of the little water she made in a few minutes. During the night the rollers came in heavily on the beach, lifting the ship up from four to five feet and thumping her heavily on the sand as they ran back. When the morning dawned it was soon discovered that she was much out of shape, her back broken, butt ends started and bottom probably bilged; she was then making a great deal of water; her connecting pipes were all broken, rendering the engines entirely useless. The sea did not fall, and at 9:00 A.M., the tide flowed and ebbed into her....the hope of saving the ship seems abandoned....Her officers and crew feel as if they were attending the funeral obsequies of a dear and valued friend. She was a favorite craft and one of the best sea boats that plowed the Pacific Ocean. She was the home, the pride and refuge of her officers and crew, and many a tear as salt as the brine that surrounds her shattered hull has coursed unbidden from manly eyes, and sprung up involuntarily from the bold and courageous hearts of those whose pride and delight she was, as they have gazed upon the last resting place of the gallant Tennessee. (Alta California, March 9, 1853)

Despite the loss of the ship, Pacific Mail, anxious to save whatever they could, dispatched workmen to unload the cargo and salvage the valuable fittings. Aided by a few male passengers still on the scene, the workers unloaded the ship as it began to go to pieces in the surf. Around noon on March 8th, the hull split, and "all that heavy machinery went right down through the bottom" as the engine tore loose of its timbered mount and broke apart. (Stocking 1891:356) The hull, now breached in several locations, quickly flooded, filling under the salvors as they worked. "The last piece of baggage I got

Wreck of the Tennessee.



ashore was a friend's side-saddle, that was in a locker in her cabin, way down aft, and I dug it out for her just as the water was filling the cabin." (Stocking 1891:355) A visit to the wreck of the Tennessee on March 10

revealed her condition to be perfectly hopeless, and her situation almost unfavorable for the preservation of the valuable portions of her machinery and fixtures. She is fast going to pieces. Every joist appeared started. The sea was thumping heavily against her side, and the surf flying wildly over her. She cannot hold together another week. (Alta California, March 11, 1853)

A few additional items were saved from the wreck on March 14 by the schooner Taranto, which reported the Tennessee was "rapidly going to pieces" with the "surf rolling incessantly upon her." The Taranto, after losing both anchors and their chains on wreck, docked in San Francisco.

All the express matter and the ship's tackle have been brought up, but in a slightly damaged condition. The heavier portions of the machinery will hardly be saved. (Alta California, March 14, 1853)

The Taranto revisited the wreck on March 18th and watched the Tennessee disintegrate after salvaging a few goods:

The schooner Taranto came up from the wreck of the Tennessee last evening, with a portion of the ship's furniture, &c. We learn from Capt. Wright that the ship is fast going to pieces. Her smokestack, with a portion of the upper deck, fell yesterday. The offshore side is much shattered and broken, and as there was a heavy gale yesterday, he thinks she will go entirely to pieces during the night. When he left there was a very heavy surf on, and in getting under way he lost one anchor and chain. It was with difficulty he got his vessel clear of the beach. (Alta California, March 19, 1853)

The ship was a total loss at an estimated value of \$300,000, in addition to the many costs of rescue and salvage, which totalled \$28,892.62. (Pacific Mail Journal 1853:182-202) The Captain was blamed for the wreck by the Company, one passenger noting

They laid the accident to him, for he ought not to have tried to make the Gate in that fog without more care. It appeared that the Sierra Nevada could be seen going in ahead of us, and we had followed her; Mellus didn't want the opposition boat to go in ahead and report that we were outside. (Stocking 1891:357)

The sympathies of the passengers for the Captain were aroused, doubtless in part for the competent actions of the crew in not letting them drown and, of course, for saving their baggage. At a meeting held on the beach, the passengers elected a committee of their more distinguished fellow travelers, headed by Peter Skene Ogden. In a public letter in the Alta California, the committee explained that

the passengers are desirous that justice shall be done, in placing Capt. E. Mellus and his officers in a proper position....Resolved, that in our opinion the disaster is in no way attributable to any want of skill, or prudence in seamanship, or vigilant foresight, which could have averted so sad a result....
(Alta California, March 9, 1853)

Pacific Mail was apparently convinced, for the next month Mellus was placed in command of the Pacific Mail Steamer Columbus. Adams and Company agent Thomas Gihon was also singled out for praise as a hero by the grateful passengers, who "held a meeting, and voted thanks...and said all sorts of flattering things about his services in saving the women and children." One wonders if the men who attempted to rush Gihon's boat were among the flatterers.

Through the intervening years since the wreck, countless visitors to Tennessee Cove have noticed pieces of wreckage protruding through the sand at various times. Unsubstantiated oral tradition mentions boilers and a huge anchor; an 1880 account notes that "all that remains of her now is the shaft, which may be seen at low tide..." (Munro-Fraser 1880:397) The shaft in question is probably the paddlewheel shaft still visible in the surf during minus tides in the springtime. The crosstail of the engine was also seen occasionally, peeking up through the sand to provide a clue for future archaeologists seeking the Tennessee's grave.

III. ARCHAEOLOGICAL BACKGROUND

A. HYPOTHESIZED COMPONENTS

The wreck of the S.S. Tennessee left a definite trace in the archaeological record; this is significant since the Tennessee could not have left a trace in the archaeological record had she been pulled off and saved:

A ship undertaking a voyage leaves absolutely no imprint...if all goes well, the evidence will be effectively dispersed at the end of the voyage, when the cargo is sold, the crew go to their homes, and the ship is taken on for a new enterprise or broken up. It is only if disaster strikes during the voyage, and the whole unit--ship, cargo, and shipboard community is deposited on the sea-bed, that there is any chance of a permanent material record which is archaeologically recoverable (Muckelroy 1978:7).

The Tennessee also left a definite trace in the historical archaeological record; written records of her career and construction, however subject to destruction and dispersal, have survived and with whatever archaeological remains of the actual vessel that have also survived comprise the components of 4-MRN-506H. A discussion of the suspected components of the site, of their extent, and of their integrity, is essential and necessary in this research design. Hopefully, the investigation of the site through research and documentation through survey and some test excavation will further define these components and allow for a more detailed assessment of the site.

The S.S. Tennessee went aground on the beach that now bears her name on the morning of March 6, 1853. The surf was relatively calm, and the tide was high, being somewhere in the area of +4.3 feet. (Coast Survey 1853:182) These conditions drove the vessel high onto the beach with little damage, but also slowly trapped the hull with a tremendous overburden of sand. The passengers, mail, baggage, and express were safely landed on the beach by March 7th. At the same time, stores, some cargo, and sails and mattresses were removed, but heavier items, such as furniture, tools, equipment, and most of the cargo were left on board as "there is no doubt that the Tennessee will be gotten off." (Alta California, March 7, 1853) However, increasingly heavy surf conditions soon pounded the ship's timbers apart, and the vessel disintegrated within a matter of days. Some of the items left on board were saved, but doubtless there was also much that was left behind to become part of the archaeological record of the ship's destruction. Therefore, it is expected that the material remains present at 4-MRN-506H will consist of many varied artifacts. In addition to structural members of the ship's hull and engine, some representation in the archaeological record of cargo, stores, furniture, and some personal effects, while minimal, is expected.

The wreck of the ship apparently happened in distinct phases that may be traceable in the archaeological record as patterns of wreckage distribution. However, factors such as post-wreck disturbance by nature and man, intrusive artifactual features, and the complete disintegration of organic members will effect any efforts to identify patterns. The first disposition of wreckage, apart from easily movable pieces of deck furniture and fittings that would have been washed overboard as the ship was being evacuated, would be the copper sheathing used to protect the vulnerable wooden hull from the onslaught of teredo navalis, the marine-borer. With the hull being washed freely by the surf prior to

its bedding down in the sand, interaction with the sand and gravel beach caused the sheathing to be "much chafed and rubbed off." (Alta California, March 8, 1853) The wreckage from the upper works that was washed ashore at the same time was effectively destroyed by the passengers, who used it to fuel their campfires. (Stocking 1891:355) The torn and scattered sheathing, however, being heavier and having been shredded into small pieces, would have settled undisturbed, possibly in a pattern, to be buried by the sand. Erosion of the beach in 1891 exposed several portions where high concentrations of copper sheathing nails with their heads broken or worn away and small fragments of copper sheathing were present. Land-based testing of these areas might verify a patterned distribution.¹

The later stages of the wreck would have involved the disintegration of the hull. It is highly unlikely that the entire hull was destroyed; the fact that the ship was deeply imbedded in the sand and the Goliah could not pull her off would indicate that the lower members of the vessel, such as the keel and the bottom frames, might have been protected and survived since they were buried in the sand. The heavier parts of the engine, such as the huge side-levers and the 75-inch diameter cylinder would pin the lower portions down, much as the iron ballast of the Dartmouth, a 1690 wreck, did. (Muckelroy 1978: 166) The hull would come to rest on a compact substratum layer of pebbles or gravel, and would be covered by the loose sand. The preliminary indications are that the lower portions of the hull have indeed survived, since the preliminary magnetometer survey done by David and Steven Buller outlined a large hull sized area. A detailed recorded survey of the area with magnetometers, a side-scan sonar survey of the area to identify beach layers and any wreckage "lenses" and some limited excavation to disclose buried hull members and to assess their condition would verify if there is an intact portion of the Tennessee's hull present at the site.

The upper works of the hull, as stated before, would have been washed ashore, where they would have been subjected to an exposed environment not conducive to the survival of wooden structural members. As a result, only non-organic members of those portions, such as brass and copper spikes and drifts, iron drifts, and nails would survive. Testing of the site through limited excavation on land and under water might disclose pockets of this type of material. Other wreckage that would have washed ashore might consist of larger metal objects attached to structural timbers. The iron plate sheathing of the engine room walls, the iron coal bunkers, and portions of the smokestack, which fell as a unit attached to the upper deck, might conceivably have washed ashore or settled on the bottom near the main wreckage deposit. (Alta California, March 19, 1953) Erosion of the beach in 1981 disclosed three artifacts clearly associated with the Tennessee which evidently fall into this category. They were identified as a portion of a cast-iron walkway from the engine room, a tread from a cast-iron stairwell, again from the engine room, and half of a cast iron flange for a steam pipe. Nearby, a large piece of double riveted iron plate probably came from the engine room walls or the coal bunkers as it

¹ The limited five unit excavation discussed in Part I, Section C, "Previous Work" disclosed the high amount of copper and brass. However, the units were grouped in one area, not being part of a comprehensive study and no conclusion can be reached until further limited excavation in other areas of the site offers a varied sample.

showed indications of having originally been flat, was also exposed by the drastic erosion on the beach. All of these pieces would have to have been washed into the higher levels of the beach where they later were found as floating wreckage attached to now disintegrated wooden members. Again, carefully selected limited testing of areas of the site will prove or disprove this hypothesis.

The breaking up of the engine into smaller components is an established fact. The potential for articulated portions of the machinery is slight. The engine plans for the Tennessee show her to be slightly built. According to steam engine expert William D. Sawyer, whose analysis of the Tennessee's engine is included as an appendix to this research, the "Tennessee's engine has a light wrought iron tie between cylinder and crankshaft and seems to have only wood beams for a bed plate, thus the engine could have broken into several pieces." The engine's disintegration was witnessed by passenger Fred Stocking, who stated "all that heavy machinery went through the bottom," indicating that the hull ruptured and some large pieces broke clear of the hull. It seems likely that these pieces were the paddlewheel shafts and the connecting pieces of machinery such as the crank and the cross-foot, which while large were among the smallest components of the engine and hence the easiest to move. Also, the stress placed on the paddlewheel shafts as the hull twisted and shook with the surf action would have conceivably torn the connections in the crank loose. It is significant to note that two engine pieces observed in the site are a paddlewheel shaft and cross-foot. While it does appear that these portions of the engine were torn loose and were disassociated with the main wreckage deposit, the heavier portions of the engine, such as the cylinder and side-levers, most probably stayed with the hull and pinned the wreckage to the sea-bed. Detailed surveys of the site with magnetometers and other metal detection devices would disclose scattered wreckage and test excavation of some of these areas as well as those portions of the main wreckage deposit where the engine remains would be would prove or disprove this hypothesis and assist in the evaluation of the integrity of the engine remains.

It is essential for the documentation project that a detailed survey of the site to determine the process of the shipwreck and hence evaluate the integrity of the hull and engine be conducted. Knowledge of the extent of the remains will play an important part in any future research and excavation and the integrity of the remains, if known, will aid in the formulation of new research questions and in the refining of those presented as part of this research design.

In addition to any remains of the engine and the hull of the Tennessee, either as intact assemblages or as disassociated components, there is also a possibility of some representation components, there is also a possibility of some representation in the archaeological record of cargo, equipment, stores, and personal effects. Some potential material might consist of pottery, glassware, faunal remains, and various and sundry items with little or no salvageable worth at the time of the wreck. Some items might have been broken by the initial impact of the ship hitting the beach; passenger Stocking noted that crockery and other items on his breakfast table were thrown down by the impact, and in other parts of the ship loose crockery and glassware would have presumably also fallen and broken. Such materials would not be considered worthy of salvage and would have been overlooked by the workmen who were hastily stripping the ship as it broke up beneath them. Passenger Stocking also noted that the lower portions of the hull flooded quickly during the salvage process and as he removed a side-saddle from an aft cabin below decks it filled with water. In the rush, many small goods would be overlooked. For example, it is known that not all furnishings on the Tennessee were

salvaged. (Alta California March 19, 1981) Therefore, it seems likely that the archaeological record of 4-MRN-506H will consist of more than hull and engine remains and components.

As stressed earlier, there is also a potential for many documentary records of the Tennessee to have survived. Preliminary historical research in the Western United States has shown a potential for many detailed records of the Tennessee's operation and some details of physical characteristics. At the same time, it is known that many records have been destroyed, including the bulk of contemporary records of her career with the Pacific Mail Steamship Company, which were destroyed almost entirely by fires in San Francisco in 1906 and in New York in 1907. (Kemble 1981)

It would be assumed that surviving records would be located in the urban centers where the Tennessee operated. Archival research in New York, Savannah, Panama City, and San Francisco would therefore be expected to locate many documents. At the same time, records which have been dispersed to various archives and libraries around the United States must also be taken into consideration. Known institutions with holdings relating to the Tennessee are the California State Library in Sacramento, the Huntington Library in San Marino, the Webb Institute in Glen Cove, New York, and Harvard University. At the same time, there must be materials held in private collections such as diaries, letters, and journals describing the Tennessee's voyages, perhaps in the hands of descendants of the Tennessee's passengers and crew. A few instances where this is known to be the case are the letters of Charles and Elizabeth Ashton, Tennessee passengers, which are owned by their descendants in Oakland. The descendants of Johann Hein, another Tennessee passenger, own his original diary of his trip to California on the Tennessee.

Another valuable resource associated with passenger descendants would be the recollections of Tennessee passengers. While this resource must be used with caution, interviews with descendants might disclose additional information. Careful research with the archaeological remains and the archival record could provide a means of checking the oral information. Recent interviews with Mrs. Dorothy S. Gould, 97, of San Francisco, and Mrs. Elizabeth Ashley, 93, of Oakland, disclosed many details about their grandparents' trip on the Tennessee's last voyage. Available information previously collected allowed for a comparison of known, researched fact to their stories, which were found to be accurate. The resource of oral tradition must not be overlooked and other descendants of passengers must be located, not only for documentary materials such as letters and diaries, but also for otherwise unrecorded memories. Other benefits may become apparent at the same time. Mrs. Gould's family owns a fork taken off the Tennessee during the salvage, and Mrs. Ashley's family owns scraps of fabric from the cabin of Charles and Elizabeth Ashton as well as some furniture salvaged from the wreck's cargo.

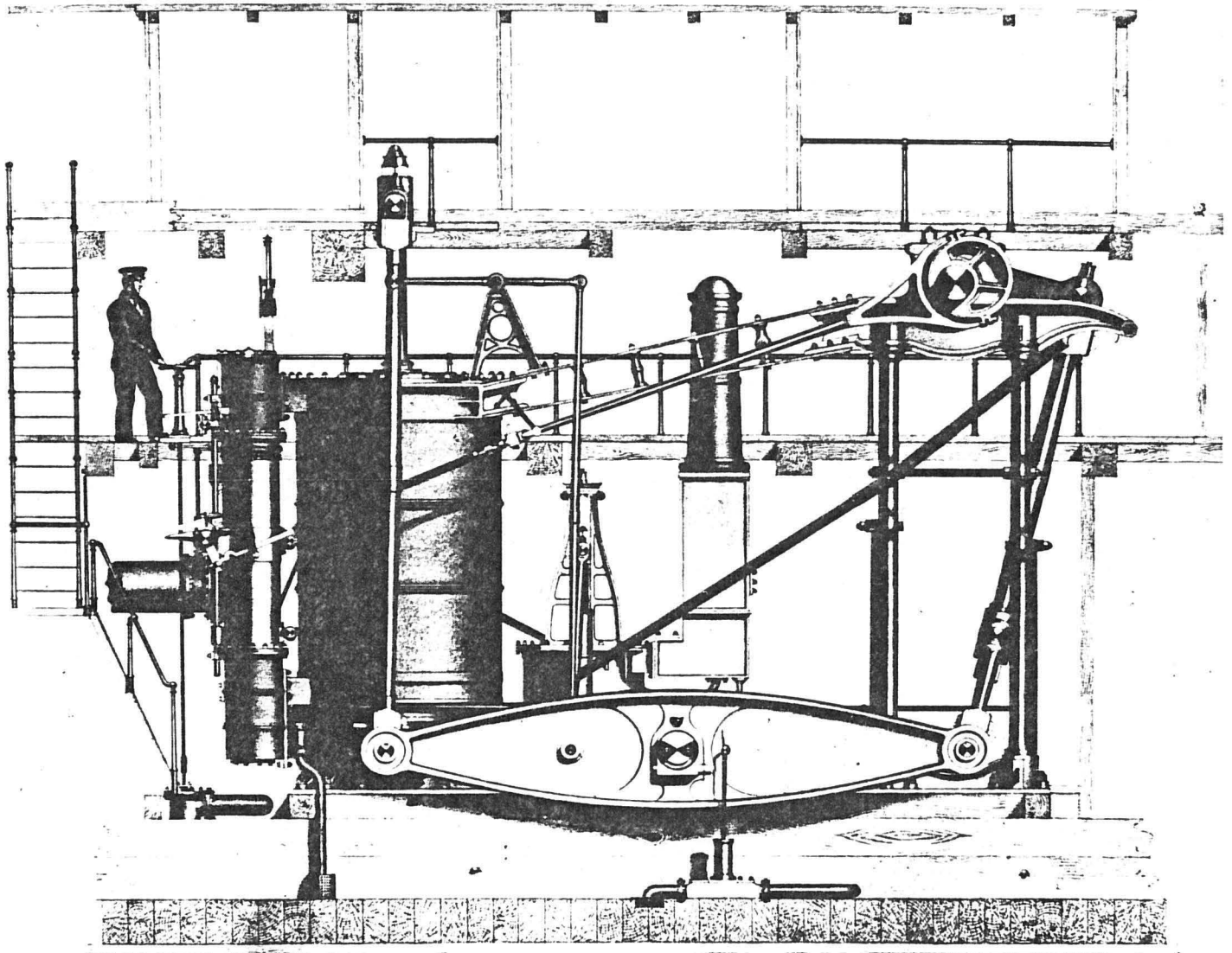
There are many resources relating to 4-MRN-506H; the survey and documentation of these resources is an important task that will be outlined in later sections of this research design.

ENGINES OF THE
NEW YORK & SAVANNAH STEAM NAVIGATION CO'S SHIPS
TENNESSEE & CHEROKEE.

STILMAN, ALLEN, & CO, NOVELTY WORKS.

NEW YORK 1849.

SIDE ELEVATION.



DRAWN BY FREDERIC COOK, 1849.

B. INTRUSIVE ELEMENTS

As with any other archaeological site, the potential for intrusive material in the archaeological record is high at 4-MRN-506H. These materials, all of which are known to exist at the site, fall into four basic categories: 1) other shipwrecks; 2) flotsam and other debris brought in by the ocean, 3) World War II fortifications, and 4) garbage dropped on the beach by visitors. All will be discussed in detail below.

1) The S.S. Tennessee was the third vessel known to have wrecked in Tennessee Cove. The first, a 40-ton schooner, the Fourth of July, wrecked in the cove in March of 1849. Locally built by Thomas and William Johnson in Bolinas, the Fourth of July

was on her way up the coast when she was met by a gale from the north, which caused her to turn about and seek port for safety after having proceeded as far north as Point Reyes. The wind blew with such fury that, although sailing before it, the waves swept over the vessel with such force that two men were washed overboard, leaving the Captain alone to meet whatever fate awaited him and his craft. The wind blew toward the land with such force that the Captain saw that she must go ashore, so he made for the beach at this valley (Tennessee), hoping to be able to hold her with an anchor and be able to get off safely, but the anchor failed to hold her, and the mighty breakers which were running mountains high and dashing upon the beach took the vessel, as a toy in the hands of a giant, and tossed it end over end far upon the sand. Nothing was ever seen of the Captain afterwards. (Munro-Fraser 1880:398)

In association with the copper and brass that was exposed during heavy beach erosion in early 1981, several small brass or copper fastenings were noted and recovered. They were shown to Maritime Museum Curator Harlan Soeten, who determined that they were ship fastenings for a small vessel of less than eighty tons. The fastenings were hand-made, and it seems likely that they may be from the Fourth of July. Additional remains from the ships are likely to be associated with the remains of the S.S. Tennessee.

In addition to the Fourth of July, another sailing vessel wrecked in the cove. On August 5, 1851, the San Francisco Alta California reported

The Wreck of the Tagus--The Steamship California, Capt. Budd, left yesterday morning at daylight, and proceeded to the ship Tagus, ashore in Potatoe Cove, outside "the Heads," for the purpose of hauling her off if possible. Finding it impossible to render any assistance, she returned at 8 o'clock. We understand that the vessel will prove a total loss, but that most of the cargo will be saved, should the present fine weather continue. Several schooners and lighters are engaged in getting out her cargo.

The Alta California of August 8th reported that most of the cargo had been landed in the city, but there are no further reports on the condition of the ship, or of her fate. It should be supposed that the Tagus, like the Tennessee, disintegrated in the cove. Careful

research in archival sources and a careful survey program at 4-MRN-506H will be necessary to discriminate between the remains of the two vessels. It should be stressed, however, that it is deemed highly unlikely that any significant hull remains associated with the Tagus will be encountered since she carried no heavy iron machinery to pin her wreckage down.

The last known shipwreck to deposit materials at 4-MRN-506H was the January 1980 wreck of the barges Kona and Agattu at Bird Rock, which is approximately one mile north of Tennessee Cove. The barges, which were being towed to Hawaii, came loose and drifted in close to shore, where the surf wrecked them. Several large sealed metal crates of toilet paper and beer broke away from the barges and drifted along the coast, one of them coming ashore at Tennessee Cove and disintegrating. Much of the wreckage was salvaged, but portions of the corrugated steel supports from the crate are still found in the surf and on the beach. Fortunately for archaeological research at 4-MRN-506H, these portions are easily distinguishable from the wreckage of the Tennessee and the earlier shipwrecks.

2) Photographs of Tennessee Cove taken by the National Park Service in the past few years show heavy deposits of flotsam on the beach at certain times of the year. Logs, portions of piers, pilings, and wharves, as well as other floating garbage brought in the tides, have dotted the beach for years. Presently, several dozen large logs and pilings rest on the upper portions of the beach; some are part of huge log rafts that were towed along the coast in the 1930s. One log on Tennessee Beach has metal lined openings at both ends for a chain to pass through for linking it to other logs to form a perimeter for a log raft. Another log of this type is located one mile south of Tennessee Cove at Rodeo Lagoon. Through the years, the deterioration of this flotsam, as well as its destruction through use as fuel for beach fires has deposited pockets of material. Careful analysis of these items will be necessary to discriminate between relatively modern metal fittings from flotsam or wreckage from the S.S. Tennessee.

3) In 1937, Tennessee Cove and Tennessee Valley were included in the recently expanded military reservations on the Marin peninsula. As part of Fort Cronkhite during the Second World War, Tennessee Cove became the base for submarine mine defense of San Francisco harbor. In 1942 and 1943, construction of a mine firing facility began in Tennessee Cove. It consisted of three concrete structures above the beach; a spotting station, a generator room, and a cable hut were built. A multi-strand steel cable to carry the electric impulses needed to fire the mines in the channel off-shore was brought over the hills to the cable hut, and then run down along the center of the beach into the water. Concrete filled bags were placed atop the cable to weigh it down. All of these features are still present, and erosion of the beach has exposed the mine cable several times in the past, the latest appearance being in early 1981. Corrosion of the cable has deposited hundreds of wire strands on the beach, many of which are intermingled with the wreckage of the Tennessee. Other materials that have been observed on the beach that are apparently associated with the wartime use of the site are round nails, which were probably part of the wooden frames for concrete forms, and cartridges from military weapons. Fortunately, these materials are easily distinguishable from the wreckage of the S.S. Tennessee.

4) Heavy visitation of Tennessee Beach has introduced an intrusive element of modern garbage to the archaeological record. Beer and soda cans, coins, and other small items dropped on the beach by visitors have infiltrated the archaeological record. It should be noted that not all of this visitor introduced material is contemporary with the

administration of the site by the National Park Service; a corroded silver serving knife from the 1930s was collected during heavy beach erosion and seems to be from the pre-war use of the beach as a popular picnic spot.

C. BENEFITS OF STUDY

1. LOWER-LEVEL INTERPRETATIONS

Through the study of the S.S. Tennessee and site 4-MRN-506H much can be learned about the specifics of early American maritime architecture, particularly the adaptation to a then infant steam technology as practiced by one of the nation's foremost marine architects, of the role of steam shipping in the development of a hastily-created culture on the west coast of the United States, and of the influences of American material culture on the development of the west coast. Many specific research questions will be presented later in this research design that will hopefully provide a framework for the investigative processes that will address the basic themes detailed above. It is the purpose of this section to define the perimeters of the documentation project proposed in this research design for the site 4-MRN-506H.

As stated in the introduction to this research design, the proposed work, which will be outlined in detail in a later section, is intended as a program of historical research and archaeological investigation to fully document the extent and the integrity of the remains of the S.S. Tennessee which comprise the resources of site 4-MRN-506H. The research questions and benefits of such a project are self-evident: how much has survived? What is its condition? Would future study through excavation or salvage be feasible or worthwhile? Such questions can only be answered at the completion of the project outlined in this document. However, additional questions, many of them related to the basic themes outlined above in the first paragraph, will come to play during this project. Not all of the potential research questions will be answered, nor will they specifically be pursued during the project, but an incidental benefit of the project will be the providing of answers to some of the research questions and the partial answer to others.

Because of the potential for answering some of the research questions, and to assess the significance of 4-MRN-506H, the following discussion of the types of interpretations that could be made through the study of the site is offered.

Lower-level interpretations be those that directly related to vessel or site characteristics. While important in nature, they do not offer broad-based interpretations which discuss the implications of the data in terms of larger research themes such as the Tennessee's role in the development of American steam technology, naval architecture, the development of a new culture on the frontier, and as an instrument of transportation of an older culture to the new. These themes and the higher-level interpretations will be discussed in detail in the next section.

The first lower-level interpretation concerns the state of the resource. Research will hopefully disclose the process of the Tennessee's disintegration and the deposition of material into the archaeological record. An understanding of this process is essential to further study. One important question that will be raised is the nature of archaeological record; is it a "continuous" or "discontinuous" site? The violent nature of the Tennessee's destruction could have scattered non-articulate debris across the sea-bed and left a much disturbed and muddled archaeological record. This would be the direct opposite of a wreck where the vessel rapidly sinks in deep water to slowly disintegrate as a complete unit and the archaeological record can be quantified and analyzed in phases, much as has been done with Classical Mediterranean sites by George Bass and his associates. (Bass 1966 and Throckmorton 1970)

The nature of the Tennessee site, as discussed in the section dealing with the hypothesized components of 4-MRN-506H, is probably a mix of both a continuous and discontinuous site. The lower hull, with some larger engine components, is expected to exist as a complete unit, while scattered wreckage on the upper beach and around the hull is known to exist. While initially "disturbed" and scattered in appearance, this wreckage may fall into distinct patterns that indicate phases of the wrecking process. The study of discontinuous sites is a relative infant in the new field of underwater archaeology. At one time it was thought that the quality of evidence obtainable from a discontinuous site of a shipwreck

which has been destroyed and scattered over a large area of bottom by the violence of the sea and the wind is generally the least rewarding site to the archaeologist seeking information on structures or the relationship of materials within the wreck. The best an archaeologist can do...is generalize. The ship foundered in chaotic conditions and the evidence is subsequently scrambled. (Burgess 1980:271)

However, this has proved to not be the case. A complete analysis of the site, particularly of the wrecking process, and environmental factors such as tide, current, and sand movement, provides the means to quantify and analyze the wreckage in terms of patterned distributions. Work on the Dutch East Indiaman Kennermerland (1664) in the British Isles has shown that patterns do exist, and that diligent research on the site characteristics can make sense of the scramble. (Muckelroy 1978:213) It has been suggested that the further development of this type of study would be

the computer simulation of the shipwreck process in any particular set of circumstances, to be tested for "goodness of fit" against the observed patterns. In the early stages of such an exercise would undoubtedly be confused and unsatisfactory, but the hope would be that in time the significant factors would become clear... (Muckelroy 1978:214)

The Tennessee site would be an ideal testing ground for the thesis of patterned distributions being apparent in discontinuous shipwreck sites. The site is not entirely discontinuous, since the available evidence suggests the survival of a large portion of the hull, and the more readily available amount of information for the wreck, when measured against the archaeological record and known environmental factors, could provide the framework for a meaningful analysis of the discontinuous areas. The incidental contribution to underwater archaeology would be one of the benefits of study of 4-MRN-506H. While complete excavation may be necessary for any final results, the work necessary to document the site components as proposed in this research design may offer some initial conclusions and set the stage for significant work in the future.

Other obvious benefits of study at 4-MRN-506H that fit into the category of "lower-level" interpretations would be the documentation of physical characteristics of the vessel and the engine, both of which are significant early examples of their type, the Tennessee's engine specifically being the earliest known remains of an American-built marine steam engine. The importance of William H. Webb, one of the foremost naval architects and shipbuilders of America's Industrial Age, and the relatively early production of the Tennessee by his yard provides some indication of the Tennessee's important role in naval architecture and the adaptation of sailing craft to marine steam.

While some documentation exists in the archival records, it is often not finite or detailed enough to allow for intricate details for the individual vessel. Much can be assembled through a program of careful documentary research and such a program is urged; but at the same time the remains of the Tennessee should be preserved and eventually studied as the physical "proof-positive" of the written record.

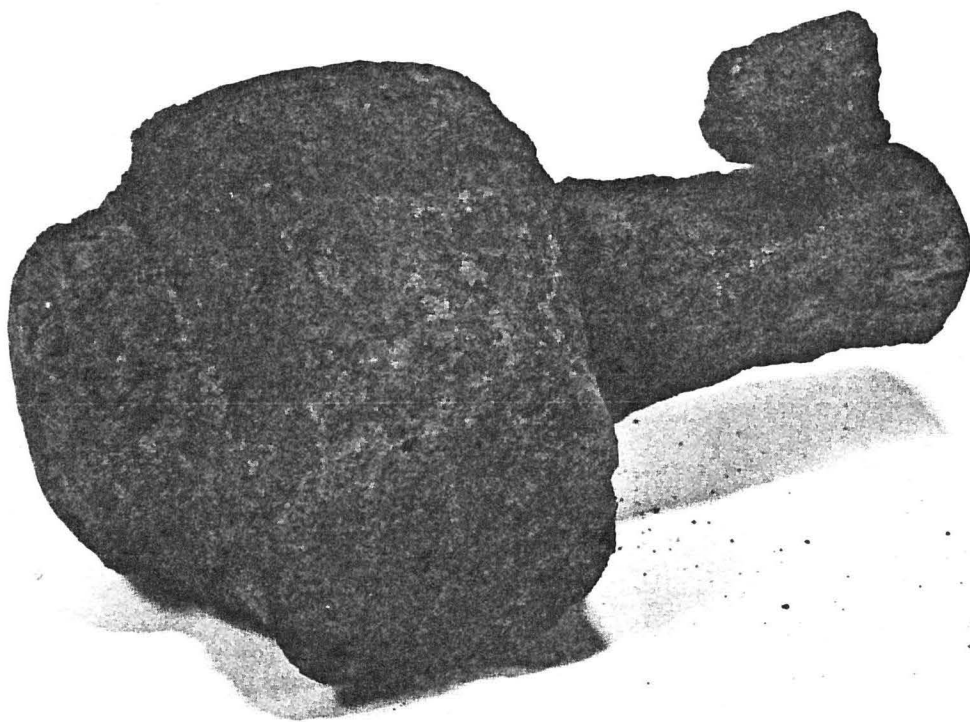
At the same time, the intrinsic value of the study of any cargo remains is important. As "lower-level" interpretations, the actual types of cargo as material culture being introduced to California would be important, particularly for what it would offer by means of its specificity to broader based interpretations. The value of knowing the brand name and the type of item when compared to a general listing of "brandy," or "sundries" or "ten cases of machinery" is significant. Knowing the types and the availability of those types of merchandise carried on the Tennessee and her sister ships by means of archival research and archaeological research, whenever possible, is essential. Work on the material culture excavated from two frontier vessels, the Niantic (1851) and the Bertrand (1865) has brought a far more detailed understanding of what was being introduced to the frontier...and hence tells us more about the frontier itself. (Petsche 1974:118-119)

2. HIGHER-LEVEL INTERPRETATIONS

In the preceding section, part of the rationale for wanting to preserve the Tennessee site was presented through an identification of some of the benefits of study. While a few of the aspects of "higher-level" interpretations that could be made through the preservation and study of MRN-506H. "Higher-level" interpretations are those which provide a broad-based understanding of the humanistic implications of the data retrieved through research. Rather than a precise knowledge of the types and variety of material culture, or of the specifics of construction and layout, the ultimate goal is to utilize that information to better understand cultural phenomena such as maritime trade, the development of the frontier and the interaction of the frontier with the pre-existing "parent" society, the establishment and interactions of shipboard communities, and adaptations of nautical technology to a new and revolutionary power source such as steam.

The hypothesized components of 4-MRN-506H offer the means, if properly addressed, to provide the data needed to understand the broad themes addressed above. Site specifically, the study of the remains of the Tennessee's engine and hull will provide a better understanding of the adaptation of shipbuilding traditions, some of them passed down from antiquity and folkloric in nature, to the new propulsion system provided by the marine steam engine. At the same time, the study of the engine provides yet another example, and a significant example due to its being the earliest known remains of its type, of the engineer's adaptation to steam power. Since the Tennessee's construction was designed and supervised by one of the leaders of the profession, the study of the vessel is important since many of the innovations of construction and design practiced by Webb would later become standard for quality steam vessels.

The Tennessee's role on the Pacific coast was two-fold; she represented, with her sister vessels, the introduction of European and Eastern American system of marine transportation, and the study of the Tennessee's adaptation to Pacific shipping patterns resulting alterations in that older system and patterns is significant. Secondly, the Tennessee, like other vessels, carried the means for the creation of a new culture in California during



Crank from the Tennessee's engine found at 4-MRN-506H. National Park Service
Photograph by Richard Frear.

the Gold Rush. In her hold, the cargo, money, and passengers--the first and last being the most important--provided the means for the creation of modern California through the introduction of older material culture and attitudes in a new society. The study of the Tennessee, then, through a detailed program of historic research, which is essential to document that which can not be found in the archaeological research, which provides details not present in the archival record, such as the detailed information about the vessel and hopefully her cargo, is a significant and important undertaking.

Through study of the Tennessee, much can be learned about an important phase in America's maritime history, historical frontier development, the creation of an American culture and society in a hastily created environment, and of an important chapter in the saga of America's progress and contributions in the Industrial Revolution. The study of 4-MRN-506H and of the conclusions gathered from that research will provide much more than an understanding of the structure and of the pattern of the archaeological record of the wreck of the S.S. Tennessee.

D. RESEARCH QUESTIONS

As stressed earlier in this research design, the research questions presented in this section relate not only to the project proposal, but also to the significance of 4-MRN-506H and the potential for the resources associated with the site to answer these questions. Not all of the questions will be answered, nor will they be specifically pursued during the documentation project, but during the course of study and documentation one benefit of the project will be in providing answers to some research questions and forming the basis for answering the others. In addition, new research questions may be formulated and the original questions will be clarified and adapted that will hopefully be answered during the documentation and survey of the site are those which relate to the extent and the integrity of the resources.

1) How did the wreck of the S.S. Tennessee occur (How did she break up)? This question, which will be pursued in the historical research and the archaeological research phases, is essential to understanding the processes that led to the distribution of the archaeological record at 4-MRN-506H. Historical research, coupled with a detailed study of the tide, wave, and current configurations of Tennessee Cove, will conceivably provide a listing of most probable areas for surviving archaeological evidence and will mean less wasted survey time. Understanding the full extent of the remains, as well as their integrity is important since it allows for an assessment of the significance of the archaeological record; clearly an intact portion of the hull is more valuable for study than a few scattered pockets of sheathing nails and spikes, and articulated engine portions are far more valuable for study than a few rusted fragments. Knowledge of these factors is essential for assessing future proposals and programs for additional research and possible excavation and/or salvage. One incidental benefit is a documented wreck profile, which could aid in preliminary assessments of wreck sites in similar circumstances.

2) How much was salvaged from the wreck? This question, which will be answered partly during the historical research phase, and more completely through archaeological research, contributes to a full understanding of the resources present at 4-MRN-506H. As mentioned earlier, remains of cargo, personal effects, and ship's stores and equipment are essential and beneficial elements that would provide for a more detailed data base that specifically would assist in assessing the Tennessee's role in transporting the

material culture of the "older" East Coast and Europe to the "new land" of California. Analysis of personal items would also contribute to an understanding of the shipboard community. Historical research will provide some details of cargo types and of inter-personal interactions of the Tennessee, but some representation in the archaeological record is necessary. The presence or absence of this type of material at 4-MRN-506H is an important question to answer.

3) What effect did the environment have on the remains of the S.S. Tennessee? Are the remains capable of preservation? This question will be pursued in the archaeological research phase, allows for a more complete understanding of the extent and the integrity of the resources of 4-MRN-506H. Completed at the same time as the phases needed to answer question number one (How did the wreck of the S.S. Tennessee occur? How did she break up?), the data gathered will allow for interpretations of factors such as sea-bed movement and erosion in the distribution of the archaeological record. Understanding the effects of the underwater environment on the remains of the Tennessee is also important in assessing proposals for the salvage and preservation of significant portions of the machinery, structure, or artifacts. The damage wrought by marine organisms, and chemical factors such as corrosion and the electrolytic conversion of metals should be analyzed with representative samples from 4-MRN-506H.

4) What are the intrusive features in the archaeological record of 4-MRN-506H? A complete understanding of all components of the site is essential to avoid faulty conclusions about the resource, particularly in answering specific questions about the Tennessee's structure and cargo. It would be unfortunate to identify a significant aspect of design or construction as being from the Tennessee when in fact it was related to the Tagus. This question can be answered through historic research, which would hopefully identify the structural details and cargo of the Tagus and the other wreck, the Fourth of July, and through archaeological research to document the variety and extent of intrusive features in the archaeological record.

5) Can the remains of the S.S. Tennessee be subjected to a future program of full-scale excavation and salvage? This question, which will be answered when questions one through four are answered, is important for assessing any eventual plans for preserving the Tennessee. It is not unlikely that the significant remains of the Tennessee's engine or the hull could be proposed for salvage and restoration in the future. The information gathered from the documentation of 4-MRN-506H would allow for an assessment of such plans. It should be noted, however, that this research design does not advocate or propose the salvage of the engine and hull of the S.S. Tennessee. Such resources are better left largely undisturbed for future advances in technology and archaeological technique.

The preceding five research questions are those which will be specifically pursued during the course of work proposed as part of this research design. All offer apparent benefits in terms of fully documenting and understanding the resources present and associated with 4-MRN-506H. This includes archaeological remains, archival records, oral histories, and natural and geographical resources. However, it is likely that in the course of the documentation, data will become apparent that will, in part, provide answers to research questions about the Tennessee's role in maritime technology, steam technology, the historical development of the West Coast, and in cross-cultural connections. Since these questions are capable of some clarification as part of this proposed project, and since they reflect the unique and varied significance of the S.S. Tennessee and 4-MRN-506H, they are presented in conjunction with this research design. As stressed earlier, future

research and examination will clarify these questions and perhaps provide the basis for asking additional ones.

6) What were the physical characteristics of the S.S. Tennessee? Through detailed historic research, consultation with naval architects and historians of marine design, and the archaeological documentation of the ship's remains, a detailed understanding of the S.S. Tennessee will be obtained. While a great deal of information is currently available, as indicated in the historical background section of this research design, a more detailed understanding of the ship's structure and construction is needed. There is little or no documentation of the Tennessee's interior arrangements, and it is hoped that details of cabin spaces, cargo holds, and the engine room will be better documented through historical research into vessels of the same type and design, as well as through the identification of remains from those portions of the ship in the archaeological record. William H. Webb was the leading shipbuilder of his day, and the identification of his yard's construction technique in the Tennessee's design would be important, as would be the identification of any older shipbuilding techniques of a traditional or folkloric nature. One last point of study would be in verifying that the limited plans that do exist for the Tennessee, which are a rarity, being "the earliest detailed plans of a completely successful American ocean steamship..." (Ridgely-Nevitt 1981:111) do indeed reflect the final product as built. This could only be done by checking the plans and lines against surviving structural members, if any, which are present in the archaeological record. Such a verification would only enhance the value of the plans.

7) What were the physical characteristics of the Tennessee's steam propulsion system? As stated in the discussion of question number six, the documentation of the actual, detailed physical characteristics of the Tennessee's boilers and engines is essential for a complete understanding of the design, construction and operation of the earliest known remaining American-built marine steam engine. While plans, or drawings, do exist of the engine, and a basic sketch, with a legend, exists for the boilers of the Tennessee's sister ship Cherokee, which reportedly had the same make and type of machinery, the study of the remains of the Tennessee's steam plant with these plans for verification is important, as is the addition of information not recorded in the archival record.

8) How does the design of the S.S. Tennessee fit into the progression of American ship design? Specifically, how does it relate to the adaptation to a new propulsion technology? This question, which could only be answered after serious archaeological and historical research to obtain a complete and detailed knowledge of the Tennessee's design and construction as specified in question number six, would be answered through detailed research of other vessels of the same class and time primarily through historical research and consultation with historians of naval architecture and nautical design. It has been suggested that the Tennessee was an important vessel in the progression of naval architecture; it would be important to verify and quantify this statement of significance.

9) What was the role of the S.S. Tennessee in the development of the West Coast and California? This question can only be answered through careful and detailed historical research. While some basic historical studies assessing the role of the Pacific Mail Steamship Company and the sea-based migration to California during the Gold Rush (Lewis, Sea Routes to the Gold Fields; Kemble, The Panama Route; Wiltsee, Gold Rush Steamers of the Pacific are a few) have been done, new scholarship defining the roles of individual vessels and of the vessels on a whole as an entity is needed. A detailed accounting of the Tennessee's role, researched through accounts of her passengers, her

voyages, her role in the local economy, both in providing employment and in buying merchandise and provisions, and in transporting treasure and the mails is needed. Archival sources particularly helpful would be contemporary business records, newspaper accounts, and account books and journals for the Pacific Mail Steamship Company and the firms they did business with.

10) What was the role of the S.S. Tennessee in the history of American shipping and water-based transportation? The Tennessee apparently played an important role in American shipping, both as one of the first two vessels on the important Savannah-New York route and as the fourth vessel on the important Panama Route. A detailed understanding of her career and contributions during her service on those routes is essential for further assessing her significance. Historical research into the histories of the New York and Savannah Steam Navigation Company and the Pacific Mail Steamship Company is necessary as is research into voyages of the Tennessee. Study of contemporary rivals is also needed for comparison and contrast purposes. Again, this research would provide for a better assessment of the Tennessee's significance and better document through individual circumstances an important phase in the history of the United States and the history of maritime navigation.

11) What was the role of the S.S. Tennessee in transporting the material culture of Europe and the Eastern United States to the new society and culture of the West, particularly California? The Tennessee, like many other Gold Rush vessels, transported cargo and other items of material culture to California during the Gold Rush. Unlike many of the sailing vessels that sailed to California, however, the Tennessee sailed many times and carried many varied items of cargo, indicating a regular pattern of supply and demand between the East and West coasts. Henceforth, it might be assumed that a study of the cargo carried by the Tennessee and her sister ships might better represent the needs and desires of the new community of California and the acceptance or denial of the material culture of the older communities back East. Unfortunately, at this time, no known records of cargoes carried, or of specific brands or types of items is available. Further research, through historical resources, and through the archaeological research of the remains of the abandoned cargo associated with 4-MRN-506H and any other sites of contemporary steamship wrecks which may become apparent in the future could indicate specific cargo types and allow for detailed interpretations of frontier trade, supply and demand, and of the socio-economic indications of the data. The initial analysis of the cargo of the Bertrand (1865) might serve as a model.

12) What can be learned about shipboard society and life on board the S.S. Tennessee? One important aspect of California Gold Rush scholarship has been the documentation of society and community, either in the Gold Rush camps or on the vessels carrying the argonauts to California. Attempts to discuss the society of shipboard life on the Gold Rush steamers have been done with some success, notably in Kemble's The Panama Route and Lewis' Sea Routes to the Gold Fields. Kemble included important references to shipboard life on the Tennessee in The Panama Route but unfortunately for this project they were few. A detailed study of shipboard society and life on board the Gold Rush steamers, particularly through the story of the S.S. Tennessee is important, and can be accomplished through the study of logs, passenger accounts in journals, log, and diaries, menus, provisioning accounts, and varied documents which relate the cyclic toll of illness and death such as the death certificate of M.M.S. Bell. (Speck 1964) By this type of research the significance of the Tennessee and her sister vessels can better be assessed.

One interesting means for study would be an anthropological approach to the study of these materials and in the formulation and testing of hypotheses.

As can be seen by the preceding research questions, many important details concerning the S.S. Tennessee and her role can be learned and their significance accessed through future research. Hopefully, these research questions, with whatever refinements or additions that may become apparent through the documentation of the resource, and the final assessment of the extent and integrity of the resource will allow for a fully informed and careful consideration of any proposals or plans for the future analysis and possible salvage of the S.S. Tennessee at 4-MRN-506H by the National Park Service and the State Lands Commission. At the same time, this information will also benefit the protection of the site by identifying its potential significance.

RESEARCH QUESTIONS AND PROPOSED WORK NECESSARY TO ANSWER THEM

Questions for the Proposed Project

1. How did the wreck of the S.S. Tennessee occur? How did she break up?
2. How much was salvaged from the wreck?
3. What effect did the environment have on the remains of the S.S. Tennessee? Are the remains capable of being preserved?
4. What are the intrusive features in the archaeological record at 4-MRN-506H?
5. Can the remains of the S.S. Tennessee be subjected to a future program of full scale excavation and salvage?

Historical Research 1,2,4

Archaeological Research 1,2,3,4,5

Environmental Research 1,3,5

Conservation Study 3,5

Questions Posed for Later Study

6. What were the physical characteristics of the S.S. Tennessee?
7. What were the physical characteristics of the Tennessee's steam propulsion system?
8. How does the design of the S.S. Tennessee fit into the progression of American ship design? Specifically, how does it relate to the adaptation to a new propulsion technology?
9. What was the role of the S.S. Tennessee in the development of the West Coast and California?

10. What was the role of the S.S. Tennessee in the history of American shipping and water-based transportation?
11. What was the role of the S.S. Tennessee in transporting the material culture of Europe and the Eastern United States to the new society and culture of the West, particularly California?
12. What can be learned about shipboard society and life on board the S.S. Tennessee?

Naval Architectural History 6,8

Economic History 9,10,11

Engineering History 6,7,8

Social History 9,11,12

Maritime History 8,9,10,12

Oral History 12

Anthropology 12

Archaeological Research 6,7,11

Folklore 6,12

IV. PROPOSED METHODOLOGY

This research design has presented the history and the significance of the S.S. Tennessee, emphasizing her wreck and destruction on the Marin County coastline in March of 1853. In the section detailing the hypothesized components of archaeological site 4-MRN-506H, the remains of the S.S. Tennessee have been discussed and their extent and integrity assessed with the little information currently available. In the research questions, the issues of the significance and the value of study of the S.S. Tennessee and 4-MRN-506H have been highlighted. Site 4-MRN-506H will be preserved and managed by the National Park Service and the State of California. As a significant maritime archaeological resource, the site may possibly be subjected to a future program of excavation and salvage. This is not proposed or planned in the phase of work detailed in this research design. What is proposed is an essential and vital documentation of the site--without an extensive program of destructive excavation. Through research and non-destructive means of survey with electronic equipment and some minor excavation, the full extent of the remains of the S.S. Tennessee will be determined and an assessment of their integrity will be accomplished. The documentation of site components will provide the basis for the careful management of the site and the protection of this valuable resource and will be the information base needed to evaluate any future proposals or decisions to excavate the site and/or salvage any portions of the vessel and her engine.

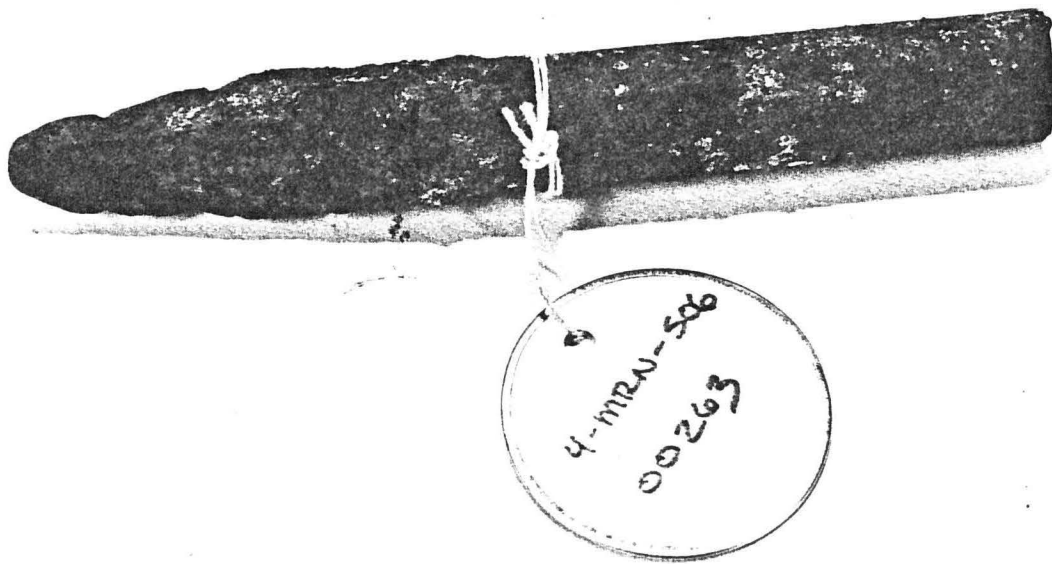
There are several steps required to document the site and to obtain a detailed and precise knowledge of the S.S. Tennessee and her role. Historical research into the ship, her construction, her voyages, her cargoes, her passengers, and her wreck and destruction is necessary. A careful study of the environment of Tennessee Cove, both now and in the past, through environmental research into tide, wave, current and sub-surface sand movement will be needed. And a careful program of examination through survey, monitoring, and limited excavation would follow, together with the carefully documented conservation of selected types of artifacts, to complete an understanding of the site and begin to assess the possible problems and costs that excavation and recovery might mean. The results of this work would be disseminated not only to the National Park Service and to interested professionals; it would form the basis for better acquainting the local residents with an important but little known aspect of their heritage. The parameters of research and study, their significance, and a detailed methodology for each phase of work will be discussed in the following sections.

A. HISTORICAL RESEARCH

The history of the S.S. Tennessee is rich and varied and relates to broad historical themes such as the development of the American nation, the frontier experience, the history of maritime transportation, and the interrelationships and experiences of immigrants enroute to a new land and a new society. A preliminary history of the S.S. Tennessee has been presented in this research design as a means for discussing the significance of the vessel and her role in the before mentioned themes. The lacunae of this preliminary history are evident, and what is now required is a complete and comprehensive account of the vessel, her characteristics, her voyages, her cargoes, and their relationship to the broader patterns of grade and frontier supply and demand, and the experiences of her passengers and crew. Historical research is necessary to answer, either completely or partially, the questions posed in this research design. At the same time, historical research will provide information to integrate into other phases of the project such as the environmental section and portions of the archaeological documentation. Clearly,

eyewitness accounts of the wreck and the break-up of the ship can add much to the interpretation of artifacts scatter, and an 1854 bathometric survey of the cove bottom could clearly delineate the changes in the site environment since the initial desposition of wreckage into the archaeological record. The historical research phase is essential to the accurate interpretation of the site and its resource values; by the nature of its defined role above, it should also be the first phase of work performed. The research will document every phase of the history of the S.S. Tennessee, from conception to launching, from first voyage to last. The role of the S.S. Tennessee in two pioneer steamship lines, on both coasts of the United States, and a study of her cargoes and passengers on both will be documented. The research necessary to complete this documentation will involve trips to eight localities in the United States, most of them the ports of call for the S.S. Tennessee. Research will center on primary resources in archives and libraries but will not exclude the essential humanization of the story through the use of oral histories and materials obtained through contacting descendants of the Tennessee's passengers and crew. At the same time, in-depth consultation with experts in the various phases of the historical themes discussed above will be featured. Sources of inquiry will be newspaper accounts, the journals and workbooks of her builder William H. Webb, the business records and accounts of her owners, and the journals and diaries of all connected with the vessel and her voyages.

Research activity will commence in the San Francisco Bay Area. Research into general references to the S.S. Tennessee, specific accounts, and materials relating to the vessel, the Pacific Mail Steamship Company, and her passengers and crew will be sought, along with references to the history of the site, in the local archives and libraries of the University of California, the Bancroft Library, the Society of California Pioneers, the National Maritime Museum of San Francisco, the California Historical Society, and the Marin County Historical Society. In addition to printed and written materials, graphic materials such as maps, photographs, drawings and lithographs will be consulted. At the same time, consultation with the staffs of the various institutions mentioned will be conducted, as well as with various local experts such as steam engine expert William D. Sawyer, Naval Architect Ray Aker, Historian Nancy Olmsted, and other individuals with expertise and experience in detailing the history of Gold Rush era vessels. Research at the University of California and at the California Academy of Sciences will also be conducted, specifically for information concerning the nature of and the environment of the site. Descendants of the passengers and crew of the S.S. Tennessee residing in the Bay Area will also be located and oral histories recorded where necessary. At this phase of the research, it would be hoped that family owned primary materials such as letters, diaries, and accounts might become apparent. Various aspects of the Tennessee's history not essential to documenting the actual history of the ship will also be researched at this time; this includes a detailed study of the cargoes and provisions carried on the ship throughout her California career. Such research is necessary to reconstruct the role of the ship in maritime trade and in the frontier economy; it would be accomplished through the study of the consignees of Tennessee cargo listed on the newspapers of the time, and of the provisioners of the vessel in the Pacific Mail account books, and research into the types of materials and goods they dealt in. Contemporary cargoes of the Tennessee's contemporary ships would be compared and contrasted. This work, while centering on the San Francisco Bay Area, might conceivably extend into the subjects of inquiry at other archives and libraries in other geographical locations.



Brass Drift from 4-MRN-506H. National Park Service Photograph by Richard Frear.

Primary research in California will continue at two major archives outside of the Bay Area; the California State Library at Sacramento and the Henry E. Huntington Library in San Marino, which houses the 175,000 piece archives of the Pacific Mail Steamship Company as well as other contemporary records. Consultation with noted maritime historian and authority on the Pacific Mail Steamship Company, Professor John Haskell Kemble of Pomona College and with the staffs of the State Library and the Huntington Library will also be conducted. Materials sought will be similar in nature to those outlined in the discussion of research in the San Francisco Bay Area, though more specific primary manuscript materials dealing with the Tennessee's career with the Pacific Mail is expected at the Huntington Library.

Research outside of California will deal with the Tennessee's early career and construction. The archives of the Webb Institute for Naval Architecture at Glen Cove, New York will be consulted for materials concerning Webb and his significance as well as the construction and outfitting of the S.S. Tennessee and her sister ship, the S.S. Cherokee. Other research at the New York Historical Society and the New York Public Library will deal with Webb, the New York and Savannah Steam Navigation Company, the Novelty Iron Works, and the Tennessee's career sailing out of that port. Materials dealing with later voyages on the S.S. Tennessee are known to be held in the collections of the New York Historical Society and the New York Public Library, generally being letters and journals of New York argonauts who sailed to San Francisco. These materials will also be consulted. Specific consultation with individuals will center on a visit with Professor Cedric Ridgely-Nevitt of the Webb Institute of Naval Architecture.

Research in Savannah, Georgia will focus upon the activities of the New York and Savannah Steam Navigation Company at that port, biographical material concerning the Tennessee's owner, Samuel L. Mitchell, and the Tennessee's voyages to Savannah. Primary materials including Savannah newspapers of the period will be reviewed and the staffs of the Savannah Public Library and the Georgia Historical Society will be consulted. Research in Washington, D.C. will focus upon the holdings of the National Archives concerning the Pacific Mail Steamship Company, the Tennessee, and the career of her captain, George M. Totten, U.S.N. It is hoped through Captain Totten's naval service records that descendants will be located who may possess valuable manuscript materials saved by the Captain such as ship's logs, papers, and other memorabilia. Totten's significance as a member of the Wilkes Exploring Expedition, as an early civil engineer in Panama, as a friend of explorer John Lloyd Stephens, and as the master of the S.S. Tennessee will be investigated. Research at the Smithsonian Institution into early steam engines and consultation with the staffs of the Divisions of Engineering and Technology and the Maritime Sections is expected to yield significant information about the Tennessee's role in the marine adaptation to steam propulsion. If time permits, research at the Beinecke Rare Book Room at Harvard University, which is known to have holdings relating to the Tennessee's California career will be investigated. Research in Panama City, Panama, will doubtless locate many local references to the S.S. Tennessee. The Panama newspapers, many of which are not available in the United States, will be consulted, as will any other appropriate local sources. Visits to Chagres, Panama Bay, and other locales associated with the Tennessee will provide other information. The opportunity for extensive photography and video documentation for later interpretive presentations will not be overlooked at this time.

A few minor trips not apparent at this time will probably be undertaken to interview descendants of the Tennessee passengers and crew. Oral histories will be one of the important phases of the historical research, and all tapes will be transmitted and

deposited with the research notes and materials at the J. Porter Shaw Library at the National Maritime Museum in San Francisco for easy public access. Costs involved in the historical research phase will be specified in detail in the budget, but will include travel, salary, reproduction (xerox and microfilming), transcribing, possible purchase of manuscript materials on the open market (such as menus or printed ephemera sold by book stores and collectors), photography and photographic reproduction, and a computer listing of all Tennessee passengers and pertinent information about them. Consultant fees for Sawyer, Aker, Kemble, and Ridgely-Nevitt will also be sought.

The final results of the historical research phase will be an organized set of research files, research notes, and graphics, and a professional quality historical narrative analyzing the history and significance of the S.S. Tennessee. This report will be accompanied by a comprehensive history of Tennessee Cove and Tennessee Valley. These materials will be utilized during the other research phases and the final site analysis, and will then be included in the final presentation materials such as the report to the National Park Service, the professional and popular articles, the interpretive materials and displays, and the documentary film and slide shows. Eventual publication of the historical research in full-length book form is not contemplated at this time but may be considered in the future if sufficient material and interest exists.

B. ARCHAEOLOGICAL RESEARCH

Archaeological research at 4-MRN-506H will fall into six phases of work; 1) Environmental (Geomorphological) research; 2) survey; 3) electronic survey; 4) limited excavation; 5) conservation and 6) analysis. The most sophisticated and advanced electronic survey equipment available will be utilized for a maximum recovery of data. The emphasis of study will be upon non-destructive means of study; there will be selected excavation. Careful interaction with accomplished professionals proficient in the use of the equipment and in the theory and practice of historical and maritime archaeology will provide expertise and perspective to the project. It is important to note that the historic research and the archaeological research will closely interact to meet a common goal; historical data on the configurations, characteristics, and cargo of the Tennessee will be necessary to interpret the archaeological data while historical information about the wreck of the Tennessee and the historical configurations of the site will be utilized during the environmental research phase to help interpret patterns of artifact distribution. It is also important to note that the weakness of one data source will most probably be balanced by the strengths of the other; data lacking from the archaeological record might probably be found in the historical record--or the opposite might be true. This interaction also serves as a means of cross-checking the data and is one of the inherent strengths of historical archaeology.

The environmental research phase will be the first portion of the archaeological research. Beginning at the same time as the historical research, this work will rely on archival data in the form of past coastal charts, tide charts, and other materials. Sources of inquiry would be the annual reports of the Superintendent of the Coast and Geodetic Survey, the archival materials for early coastal surveys in the libraries of the Marine Division of the National Atmospheric and Oceanic Administration and the United States Geological Survey. Pacific Coast pilots of previous years, published and manuscript materials pertaining to the hydrography, geology, and topography of the area would also be consulted. The purpose of this phase of work is carefully document the previously recorded characteristics of the Tennessee Cove area for comparison with

modern data for current, wave, wind, tide, and sand movement in order to assess the patterns of artifact distribution for the wreck of the S.S. Tennessee. This work will be important in understanding the shipwreck process and in bringing some semblance of order to what might initially appear to be a hopelessly jumbled assemblage. For comparison with the data collected on the past characteristics of the site, particularly those present on and around March 6-19, 1853, when the S.S. Tennessee was wrecked and disintegrated, research into the present and continuous characteristics of the site will be conducted. During this phase of work, wave, tide, current, and sand movement conditions and patterns will carefully observed under the general supervision of the United States Geological Survey for computerized analysis. One item of particular interest will be the investigation of a small coastal inlet such as Tennessee Cove as a "closed system," in which sand and water continuously circulate but do not migrate into the deeper waters offshore. Such a condition has been theorized by geologists and hydrologists; the work performed at Tennessee Cove during the environmental phase will provide the first physical field test of the theory. Field observations will continue for an eighteen month period, allowing a six month overlap for better comparative data.

Concurrent with the wave, tide, wind, current, and sand movement study, geological investigation into the erosional processes, the deposition of sand, the composition of the sand, and the physical geological characteristics of the site will be conducted under the guidance of the United States Geological Survey Marine Division and the State of California Division of Mines and Geology. Such research is important since previous studies of Tennessee Cove and Tennessee Valley have indicated exceptional natural resources. Geological observations of the area have shown that Tennessee Valley is part of an erosion cut canyon which passes through an outcropping of Franciscan formation. (Chan 1974:32) The violent action of the surf at Tennessee Cove, acting on the rocks, has produced a striking multi-colored coarse beach sand composed of chert, graywache, and miscellaneous materials from the cove. (Chan 1974:32 and Wakeley 1970:238) The geological formation of the cove is particularly interesting in terms of artifact distribution since outcropping of the Franciscan formation which bisects the cove in a north-south line and occasionally surfaces above the sand as large rocks (the most prominent of which first mate Richard Dowling tied the bow of the wrecked Tennessee to) may have acted as an obstruction, trapping large amounts of smaller artifacts. (Lajoie 1981) Clearly, study of the geological features of the site would define the significance of the geological features and would identify adverse impacts, if any, that future programs of extensive excavation might have. (Rice 1981) At the same time, research into the benthic organisms of the site, particularly those of the littoral zone, would be performed and consultation and field assistance from the California Academy of Sciences utilized. The site is known to have two types of organisms which deserve special attention; these are the limpet Collisella digitalis and the giant isopod Ligia occidentalis. Examples of these organisms found at Tennessee Cove are unusual specimens; the "polished limpet shells on C. digitalis are very unusual among coastal marine organisms. This area is the only spot in Central California where these large limpets may be observed with such polished apical shells. This fact simply supports the contention that very strong waves buffet these limpets during high tidal periods." (Chan 1974:33) The isopod Ligia occidentalis is normally "about 1 inch in length and quite slender in width, about 3/8 inch. Some of these isopods (at Tennessee Cove), tucked into the sea cave crevices, are nearly twice the normal length with some body widths measuring about 1 inch. Such large organisms are not common; since the population of this species is sparse, extra conservational attention is required..." (Chan 1974:33) Careful study of these organisms during this project will be undertaken to insure that the impacts to benthic community are few and will assess the potential impacts of future large scale excavation.

As mentioned earlier, the information gathered during all portions of the environmental research phase will be subjected to computer analysis. At this phase, useful comparative data may be found through the study of similar data collected by other agencies and parties during the previous year, particularly the beach profiles recorded by the National Park Service for some Pacific coast beaches of San Francisco and Marin County during 1981 and 1982 and incorporated into a United States Army Corps of Engineers sand transport study. (Howell 1981)

The second phase of work to be undertaken during the archaeological research is a thorough and accurate mapping and survey of the site. Current maps and charts for the area do not reflect actual conditions, topography, or sea-bed characteristics. Through field surveying, plotting, and measurement, and through the use of photogrammetric plotting of aerial photographs, a detailed map of the beach areas at a scale of 1:20 will be prepared. At the same time, a bench mark, of the type approved and recorded by the United States Geological Survey, will be set under the supervision of the United States Geological Survey for use as a permanent datum. From this point a detailed grid system will be laid out at the site, extending across the beach, and into the water to a distance of three hundred feet offshore. Buoys moored in the cove will provide sighting points for land based survey teams plotting archaeological features. Some explanation of the use of a standard English foot scale is necessary since many archaeologists now utilize the metric system. The S.S. Tennessee and its artifacts were created and utilized during a period when the English foot scale prevailed. Any modern attempts to interpret their dimensional data in a metric scale would be meaningless and time consuming. Hydrographic data will be gathered through some soundings and field measurement by diving personnel. The scale map produced of the sea-bed will be at 1:20 scale.

The next section of work will be the electronic survey. This will be the first actual phase of physical documentation of the archaeological components of the site. As stressed earlier, this phase is non-destructive and will provide much of the information needed to assess the extent of the archaeological record. This work will extend to those portions of the site both above and below the water; the types of equipment utilized will be, in most cases, exclusively limited to one condition. The major piece of survey equipment that will be adaptable to both types of conditions will be a proton magnetometer. Proton magnetometers have been utilized frequently in the past, and have gradually been incorporated into many land-based and marine archaeological investigations. While the project proposes to use a proton magnetometer, the model of equipment will be far more sophisticated than previous models. Recent developments have introduced magnetometers with mini-computers which allow for the large scale storage of data during the survey sampling. The readings, the geological location at which they were obtained (the "station") and the date and time of day are retained by the unit and can then be fed into a printer unit or another, more sophisticated computer for analysis. The capacity and capabilities of such units are astounding; they are easy to use, and are more efficient than their early counterparts. Such a system has been reserved for the project and will be utilized to detect anomalies in the earth's magnetic field indicating buried objects such as metallic objects, ballast and large wooden members. All anomalies detected by the magnetometer will be carefully plotted and integrated into the site map. Cross-checking of the data (and testing the equipment) will be done through the use of the most recently developed surface and underwater hand-held metal detectors which utilize very low frequencies.

The use of the magnetometer and the metal detection devices will produce a record of presumed will be archaeologically deposited artifacts or remains of the S.S. Tennessee. Two newly developed types of equipment will enable a non-destructive means of further

identifying the anomalies. On the beach surface, a Subsurface Interface Radar system, (S.I.R.) will be used. A ground-penetrating radar, the S.I.R. maps underground "discontinuities" such as brick foundations, soil disturbances, and large objects. Mounted on a small cart, the S.I.R. is hand pulled in transects; the radar pulse is transmitted into the soil or sand, where it strikes buried discontinuities and an echo is relayed back to the unit. "By repeatedly sending these radar waves into the sand as the antenna is pulled along, a record can be generated; this provides a record of the cross-section of the sub-surface discontinuities." (Bevan and Kenyon 1975) The S.I.R. is a newly developed tool that has yet to be widely used in archaeological projects; the Tennessee project will provide one of the first major field tests of the system at a sand beach.

Another recently developed piece of sophisticated electronic equipment that will be utilized to non-destructively identify sub-surface anomalies is a sub-bottom profile unit. Similar to the S.I.R. system, the sub-bottom profile unit is towed in the wake behind a boat, repeatedly sending sonar pulses which penetrate the sandy bottom. Buried anomalies will send an echo back to the unit, which then transcribes a printed record of the item's basic shape and size. The sub-bottom profile unit will be particularly useful in identifying the various geological strata and layers and any completely buried superimposed wreckage. The sub-bottom profile unit will be used in conjunction with a side-scan sonar unit, which is similar. A towed side-scan sonar unit emanates sonar pulses along the bottom, creating a record of the sea-bed contours and any protruding wreckage or objects on the sea-bed. Side-scan sonar is rapidly becoming one of the basic tools of underwater archaeological research, and new high-resolution units have produced sharp readings of submerged ships and hulks throughout the world. Such units have located the famous Civil War ironclad Monitor, the British warship Breadalbane, lost in the Arctic in 1853, and countless other vessels. The record generated by the electronic survey equipment will identify the full extent of the archaeological record at 4-MRN-506H. The next phase of work, limited excavation, will identify the nature of some anomalies and will allow for an assessment of the integrity of the remains. Particular items of interest would be the survival of wooden hull members, as has been postulated; cargo remains; and the integrity of the cast and wrought iron engine. Excavation at 4-MRN-506H will be difficult due to the fact that the overburden is unconsolidated sand. To combat this, a series of interlocking metal caissons will be utilized both above on the beach and below the water to maintain control of the unit sizes and to prevent the continual backfilling of sand and expensive pumping operations. Small hand-held dredges will be utilized to lift sand in the water; on dry land ordinary archaeological excavation techniques will be utilized on low level sampling as detailed below. Strict recording and photographic documentation standards will be adhered to.

The excavation at 4-MRN-506H will not be total. The limited excavation proposed will sample portions of the site in an attempt to understand the characteristics of the archaeological record without large scale disturbance. There is no ideal sampling strategy for 4-MRN-506H; the geology, surf conditions, and tidal conditions create physical barriers. The sampling through excavation will be both selected and random. Selected sampling on the beach will consist of ten units selectively placed according to cost, tidal conditions, surf, and available information on high and low readings from the survey sampling. Five of these units will be at "high" readings indicating large objects--or a mass of smaller objects; while five will be at "low" readings indicating small objects. Twenty additional units will be randomly selected. The underwater excavation will consist of ten selected units, of which five will be placed in or near the main wreckage concentration (high readings) and five will be placed at low readings. There will be forty additional random units. The average size of each sampled unit will be 6.25 square feet; this will allow for a .003 percent sample of the 300,000 square foot area of

the site. Disturbance will be minimum and will concentrate on maximum recovery of data through the carefully placed units.

The excavation will disclose artifacts, some of which will be recovered for future study and analysis. The emphasis, however, will be upon the in situ study of the exposed artifacts and their reburial, in situ, to avoid a large-scale disturbance of the archaeological record. All artifacts recovered will undergo conservation to avoid disintegration after being removed from a marine environment. The techniques of conservation, and the costs, would be carefully monitored and would form one basis for future assessments of proposals for the complete excavation and salvage of the S.S. Tennessee remains. Conservation of artifacts implies a responsible action to preserve the examples of material culture that will be retained for later study and exhibit. At the same time, research into site specific chemical and environmental factors governing the corrosion of metal at 4-MRN-506H must also be considered, studied, and documented.

During the project work, field conservation of many artifacts will be conducted by the Principle Investigators, both of whom have received training in conservation theory and method. In some cases, conservation will consist of the long-term storage of artifacts in a fresh water bath with a 5 percent solution of sodium sesquicarbonate to preserve them until an experienced conservation laboratory with sophisticated cleaning and stabilization equipment can be retained. Consultation with the National Park Service conservation laboratory at Harpers Ferry, West Virginia, will center upon the services of Mr. Dan Riss, the excavated material conservator, and the staff of the Bertrand Laboratory, who were responsible for conserving artifacts received from the 1865 steamer Bertrand (Petsche 1974). If necessary, some artifacts will be shipped to Harpers Ferry for detailed attention and conservation. In all instances, techniques will be carefully documented and will be drawn from long-standing practices as specified in standard works such as Plenderleith and Werner (1971), Tarkow (1978), Brown et al. (1977), Heller (1977) and others.

The final phase of work is the most important since it allows for the interpretation of all raw data recovered. All recovered materials will be documented at this time, both through photography, and in some cases, detailed line drawings. Research into unidentified artifact types will also take place during this phase. Final site maps, detailing the extent and nature of the archaeological record will be produced, and all data will be drawn together for the final analysis and presentation. Specific analysis will be done through computer models and testing, such as has been previously mentioned for attempting to integrate the environmental, historical, and archaeological records to analyze patterns of artifact distribution. At this phase the research questions posed earlier in this document will be answered to the best ability of the project utilizing the recovered data and assessments of the integrity and significance of the resource prepared. The emphasis will be upon the complete and accurate documentation of the resource, the techniques utilized, and the conclusions of study. The dissemination of the results will be discussed in the next section, "Interpretation and Presentation."

C. INTERPRETATION AND PRESENTATION

This last phase of the project is perhaps the most important, since it draws together all of the work and disseminates the important data to the National Park Service, the professional community, the park visitors, and the general public. The important factor is the presentation and interpretation of the results of study to as wide an audience as possible and the creation of a public consciousness and awareness for significant cultural

resources. To achieve this end, the final results of this project propose to go further than a final site report and a few scholarly articles to the professional community.

The first result of the project would be a final professional report detailing the resource, the processes of evaluation and survey, and the results. This would include an analysis of factors governing the distribution of the archaeological record, a detailed history of the vessel and an assessment of her role, the integrity and extent of the remains, and recommendations for the preservation and management of the resource by both the National Park Service and the State of California. Since the results should be reported in full and/or in part to the professional community, in this case referring not only to Historians and Archaeologists but the practitioners of specialized areas of study in those fields such as maritime archaeology, conservation, industrial archaeology, maritime history, the history of technology, and California State and local history. Professional journals such as the *International Journal of Nautical Archaeology* (IJNA) the *Journal of the West*, and others would be the medium for presentation and exchange with fellow professionals.

Presentation to the interested layman is one of the most important tasks, however, next to accurate representation of the site's values and integrity to the managing agencies. Public interpretation will be on-going throughout the project and will employ a variety of mediums. The first should be an in situ display which would be present throughout all operations to answer questions and provide the means for the interested visitor to understand what is being done and what the resource is. During the course of preliminary work done on the site in 1980 and early 1981, many visitors approached the crew to ask questions or simply to have the "adventure" of watching archaeologists at work. Many visitors, viewing the surveyors, the divers, and an assembly of maps, tools, and supplies, remarked that it was better than "watching Jacques Cousteau." This humorous note highlights the interest and the perceptions of the average visitor to such sites. An in-situ display, detailing the history of the vessel, how it came to be wrecked on the coastline, and what is currently being done to preserve the site for future study would be helpful and learn more about their heritage and gain a sense of appreciation for history and archaeology. Such a display of the excavation of a buried Gold Rush hulk in the Levi's Plaza development in San Francisco in 1980 consisted of panels which could be set up and taken down each day, protected from the elements, and "illustrating the aims and historical background of the project. By viewing the historic photographs and accompanying text, hundreds of passers-by enriched their understanding of San Francisco's maritime and Gold Rush heritage and, in a real sense, participated in the research going on below them." (Pastron and Pritchett 1981:546) Realizing this, and wishing to extend the same benefits of study and presentation, an on-site display of the type utilized at Levi's Plaza will be developed and utilized at the S.S. Tennessee project.

Another means for interpretation and presentation for the general public during the course of work is through the media. Considerable media interest exists for maritime archaeological projects; news clipping files and film morgues contain many references to shipwreck sites, underwater archaeology, and notable discoveries. The appended media clippings attached to this research design partially indicate the media interest in the Tennessee project. What does not show are the time segments aired on local radio and television stations and a segment on the CBS National News. As work progresses, the results which assist in the public understanding of the project and the interpretation of the resource values but which do not endanger the resource should be presented to the local media for dissemination to the public. Fortunately, security of the site is excellent since it is a National Park Service area protected by Federal law and subjected to controlled access. Other means of presentation through a popular medium include articles or presentations in general interest publications dedicated to the history of the

west and California, and for archaeology; being presented in a readable fashion to a wider circle of readers other than professionals in a formal and technical style does not detract from the worth or value of the presentation. Specific journals might include California History, the American West, Oceans, Sea History and others. At the same time, presentation to the public might take the form of a popularly written but accurate pamphlet or booklet for sale to the general public, or a poster. Following a project to document the integrity and significance of another buried ship on the San Francisco waterfront, maritime historians and authors Roger and Nancy Olmsted

prepared a vivid poster which summarized the structural configurations and history of the Lydia through drawings, photographs, historical statistics, and lively text....Posters, which can be easily mass-produced at small cost, appeal to a diverse audience from a variety of perspectives. To the professional historian or archaeologist, they represent an innovative, stimulating reference manual; to the interested lay person, they are an esthetic educational document which is suitable for framing and wall display; to the representative of the sponsoring agency...they represent a cost-effective means of publicizing new finds to a wide audience. (Pastron and Pritchett, 1980:547)

Other means of presentation and interpretation for a wider audience would include the on-going program of documentation through still photography and filming. Still photography, specifically color slides, could be utilized in slide presentations for the local Ranger staff, for interested historical groups, and as an integral part of educational modules for local schools. 16mm photography provides the means for a popular medium; the documentary film, which has a timeless quality of wide-scale presentation that appeals to a variety of audiences and fosters a feeling of participation by an audience who could not be on the site during the actual work. At the end of the project, the final results must have a lasting meaning and presence in the minds of the public. A permanent, non-intrusive display kiosk on the site could continue to interpret the resource to generations of visitors, while a display of graphics, information and retrieved artifacts might conceivably become part of the exhibits at the popular National Maritime Museum at San Francisco and travel to various interested museums or display areas, hopefully in Marin County, the location of the research project. A traveling exhibit reaches out to a new audience; in conjunction with a showing of a documentary film or a slide show it provides a basis for renewed interested and a wider means of presentation.

To meet these goals, the following proposals are made to be carried out during and after the project:

1. The preparation of a final, professional report for the management agencies and appropriate repositories such as sponsoring institutions and agencies and archaeological data storehouses such as the California Archaeological Sites Survey Regional Office in Sonoma, California and the National Register of Historic Places in Washington, D.C.

2. The preparation of scholarly articles presenting the project and its results in professional journals.
3. Dissemination of information to the local media with special care taken to not endanger the resource.
4. Preparation of accurate articles and presentations in popular journals.
5. Preparation of a graphics illustrated poster describing the structural configurations, history, and significance of the S.S. Tennessee for public distribution.
6. The development of slide programs for the Park and for interested historical and archaeological groups.
7. The preparation of a 30-minute color documentary on the Tennessee and the project results for the general public and the preparation of a 30-minute documentary on the project for the professional community.
8. The preparation of educational modules for local schools, utilizing reproductions of historical graphic materials such as bills of fare, tickets, and representations of the vessel and the route, slides, taped presentations, and teacher's guidebooks.
9. The design and placement of a non-intrusive display kiosk on the site. It is suggested that the kiosk interpret visual features such as the frequently exposed crosstail of the engine.
10. A program of public lectures on the vessel and the project throughout the various phases of work, emphasizing tours of the site.

By completing these various tasks, the project will not only provide for the management of this important resource; it will be an educational device to better acquaint the lay community and the local residents with an important aspect of their history and enable them to better understand an often romanticized sub-discipline of archaeology.

BIBLIOGRAPHY

PUBLISHED REFERENCES

Abbott, Jacob

- 1851 The Novelty Works, With Some Description of the Machinery and the Processes Employed in the Construction of Marine Steam Engines of the Largest Class. Harper's New Monthly Magazine. II (12):723-734

Bancroft, Hubert Howe

- 1888 History of California, Volume VI:1848-1859. The History Company, San Francisco.

Bari, Valeska

- 1931 The Course of Empire: First Hand Accounts of California in the Days of the Gold Rush of '49. Coward-McCann, New York.

Bartol, B.H.

- 1851 A Treatise on the Marine Boilers of the United States. R.W. Barnard and Sons, Philadelphia.

Bass, George

- 1966 Archaeology Under Water. Thames and Hudson, London.

Binford, Louis R.

- 1972 An Archaeological Perspective. Seminar Press, New York.

Bocquet, A.

- 1979 Lake Bottom Archaeology. Scientific American, 240(2):56

Bradford, Gersham

- 1962 The Mariner's Dictionary. Weathervane Books, New York

Breiner, Sheldon

- N.D. Portable Magnetometers. GeoMetrics, Sunnyvale.

Breiner, Sheldon and Michael D. Coe

- 1972 Magnetic Exploration of the Olmec Civilization. American Scientist 60 (5):566-575.

Brown, Floyd, et. al.

- 1977 Corrosion and Metal Artifacts--A Dialogue Between Conservators and Archaeologists and Corrosion Scientists.
National Bureau of Standards, Washington, D.C.

Brown and Caldwell, Consulting Engineers

- 1971 A Predesign Report on Marine Waste Disposal. Volume II, Data Supplement. Prepared by Brown and Caldwell for the City and County of San Francisco.

- Burgess, Robert E.
1980 Man: 12,000 Years Under the Sea. Dodd, Mead, and Company, New York.
- Cline, Gloria Griffin
1974 Peter Skene Ogden and the Hudson's Bay Company. University of Oklahoma Press, Norman.
- Cornet, I.
1970 Corrosion in Archaeology. In Scientific Methods in Medieval Archaeology, University of California Press, Berkeley and Los Angeles.
- Davidson, George
1889 Pacific Coast: Coast Pilot of California, Oregon, and Washington. (Fourth Edition) Government Printing Office, Washington, D.C.
- Dayton, Fred Erving
1925 Steamboat Days. Tudor, New York.
- Delgado, James P.
1979 No Longer a Buoyant Ship: Unearthing the Gold Rush Storeship Niantic. California History. LVIII (4):316-325.
- Fischer, George R.
1976 Legal Considerations in Underwater Archaeology. Paper presented at the annual meeting of the Society for Historical Archaeology and the International Conference on Underwater Archaeology, Philadelphia, January 7-10, 1976.
- Griffin, C.
N.D. Griffin's Statistical Monographs and Courses, Number 4. Griffin and Company, London.
- Gudde, Erwin G.
1969 California Place Names: The Origin and Etymology of Current Geographical Names. University of California Press, Berkeley and Los Angeles.
- Hamilton, D.L.
1976 Conservation of Metal Objects from Underwater Sites: A Study in Methods. Texas Memorial Museum, Austin.
- Heller, Don B.
1977 Conserving Metal Objects. Museum News. 55 (5):25-29.
- Hill, C.L. and Kofoed, C.A. Editors
1927 Marine Borers and Their Relation to Marine Construction on the Pacific Coast, Being The Final Report of the San Francisco Bay Marine Piling Committee. San Francisco Bay Marine Piling Committee, San Francisco.
- Hill, M. R.
1970 Barrier Beach. In Mineral Information Service 23 (12):231.

- Hill, M. R.
1971(b) Diary of a Beach at Slack Water. In Mineral Information Service 23(12):234.
- Hudson, Kenneth and Nicholls, Ann
1979 Tragedy on the High Seas-A History of Shipwrecks. A and W Publishers, New York.
- Hume, Ivor N.
1975 Historical Archaeology. W.W. Norton and Company, Incorporated, New York.
- Hunter, J.G. and L. Pierson
1980 A Detailed Cultural Resource Evaluation of Exposed Shipwrecks in the Los Angeles Harbor Deepening Project Landfill Area South of Terminal Island, California. United States Army Corps of Engineers, Los Angeles.
- Ingle, J.C. Jr.
1966 The Movement of Beach Sand. In Developments in Sedimentology 5. Elsevier Publishing Company, New York.
- International Nickel Company, Incorporated
1977 Corrosion in Action. International Nickel Company, Incorporated, New York.
- Joukowsky, M.
1980 Field Archaeology. Prentice-Hall, Incorporated, Englewood Cliffs, New Jersey.
- Kemble, John Haskell
1934 The Genesis of the Pacific Mail Steamship Company. California Historical Society Quarterly. XIII (3-4)
- Kemble, John Haskell
1943 The Panama Route: 1848-1869. University of California Press, Berkeley and Los Angeles.
- Lenihan, Daniel J., Toni Carrell, Larry Murphy
1981 The Uwa Harbor Wreck Site: A Shipwreck Evaluation and Management Report. National Park Service, Santa Fe.
- Lewis, Oscar
1949 Sea Routes to the Gold Fields. Alfred A. Knopf, New York.
- Marryat, Frank
1855 Mountains and Molehills; Or, Recollections of a Burnt Journal. Longman, Brown, Green, and Longmans, London.
- Marsden, Peter
1975 The Wreck of the Amsterdam. Stein and Day, New York.

- McCann, A. Marguerite, J. Bourgeois, E.L. Will
1977 Underwater Excavations at the Etruscan Port of Populonia. *Journal of Field Archaeology*. 4 (3):275-297.
- McGimsey, Charles R. III and Hester Davis
1977 The Management of Archaeological Resources, The Airlie House Report. Society for American Archaeology.
- Michael, H. and E. Ralph
N.D. Dating Techniques for the Archaeologist. M.I.T. Press, Cambridge, Massachusetts.
- Miller, Robert C.
1926 Ecological Relations of Marine Wood-Boring Organisms in San Francisco Bay. *Ecology*. 7 (3):247-254.
- Morrison, John H.
1967 The History of American Steam Navigation. Reprint Edition, Argosy-Antiquarian, New York.
- Muckelroy, Keith
1978 Maritime Archaeology. Cambridge University Press, London and Cambridge.
- Mueller, J. W.
1975 Sampling in Archaeology. University of Arizona Press, Tucson.
- Munro-Fraser, J.P.
1880 History of Marin County, California. Alley, Bowen, and Company, Oakland.
- National Trust for Historic Preservation
1978 The Monitor: Its Meaning and Future. Preservation Press, Washington, D.C.
- O'Brien, Robert
1950 Commentary on the Bill of Fare for the..."Tennessee" in Bonanza Banquets. Book Club of California, San Francisco.
- Neily, R. M.
1927 Historical Development of Marine Structures in San Francisco Bay. In Hill and Kofoed, Marine Borers and Their Relation to Marine Construction...San Francisco Bay Marine Piling Committee, San Francisco.
- Parker, James M.
1852 The San Francisco Directory for the Years 1852-53... James M. Parker, San Francisco.
- Pastron, Allen G. and Pritchett, Jack, Editors
1981 Behind the Seawall: Historical Archaeology Along the San Francisco Waterfront, Vol. 2. Cleanwater Program, San Francisco.

- Petsche, Jerome E.
1974 The Steamboat Betrand: History, Excavation, and Architecture. National Park Service, Washington, D.C.
- Plenderleith, H.J. and Werner, A.E.A.
1971 The Conservation of Antiquities and Works of Art: Treatment, Repair, and Restoration. (Second Edition) Oxford University Press, London.
- Pratt, Julius H.
1891 To California By Panama in '49. The Century Illustrated Magazine. XLI (6):901-917.
- Rasmussen, Louis J., Editor
1966, 1967, 1970 San Francisco Ship Passenger Lists. Volumes 11, 111, 1V. Francisco Historic Records, Colma, California.
- Redman, Charles L.
1974 Archaeological Sampling Strategies. An Addison-Wesley Module in Anthropology, Number 55.
- Richards, Benjamin B., Editor
1956 California Gold Rush Merchant: The Journal of Stephen Chapin Davis. The Huntington Library, San Marino, California.
- Ricketts, Edward F. and Calvin, Jack
1968 Between Pacific Tides. (Fourth Edition) Stanford University Press, Stanford.
- Ridgely-Nevitt, Cedric
1981 American Steamships on the Atlantic. University of Delaware Press, Newark.
- Rosenfeld, Andree
1965 The Inorganic Raw Materials of Antiquity. Frederick A. Praeger, New York and Washington, D.C.
- Ryder, David Warren
1954 Men of Rope: Being the History of the Tubbs Cordage Company....Historical Publications, San Francisco.
- Sampford, M.R.
1962 An Introduction of Sampling Theory. Oliver and Boyd, London.
- Smith, Ralph I. and Carlton, James T.
1975 Light's Manual: Intertidal Invertebrates of the Central California Coast. (Third Edition) University of California Press, Berkeley and Los Angeles.
- Speck, R.S., Editor
1964 Death Certificate of M.M.S. Bell in California. Tamalpais Press, Berkeley.

- Stickel, E. Gary
1981 An Analysis and Interpretation of Sidescan Sonar Data Relative to Possible Cultural Resources Within the Los Angeles Harbor Deepening Project Area. United States Army Corps of Engineers, Los Angeles.
- Stocking, Fred W.
1891 How We Gave A Name to Tennessee Cove. The Overland Monthly. (Second Series), XVII (100):351-357
- Stone, Gary Wheeler
1976 Artifacts Are Not Enough. The Conference on Historic Sites Archaeology Papers, II:5-132
- Tarkow, Harold
1976 The Characterization and Preservation of Wood. In The National Trust for Historic Preservation, Editors, Preservation and Conservation: Principles and Practices. Preservation Press, Washington, D.C.
- Throckmorton, Peter
1969 Surveying in Archaeology Underwater. Quaritch, London.
- Throckmorton, Peter
1970 Shipwrecks and Archaeology: The Unharvested Sea. Little, Brown, and Company, Boston.
- Toogood, Anna Cox
1980 Historic Resource Study, The Bay Area Community: A Civil History of the Golden Gate National Recreation Area....National Park Service, Denver, Colorado.
- United States Coast Survey
1853 Annual Report of the Superintendent of the Coast Survey....United States Coast Survey, Washington, D.C.
- United States Department of War et als.
1852 Reports of the Secretary of the Navy and the Postmaster General Communicating, in Compliance With a Resolution of the Senate, Information in Relation to the Contracts for the Transportation of the Mails, by Steamships, Between New York and California. Senate Executive Documents, 32nd Congress, 1st Session, Number 50, Washington, D.C.
- Vail, Marie Rogers, Editor
1960 Gold Rush Letters of Reverend James Rogers, The New York Historical Society Quarterly, XLIV (3):259-295.
- Wakeley, J.R.
1970 The Unique Beach Sand at Rodeo Cove. In Mineral Information Science. 23(12):238.

Webb, William H.
1897 Plans of Wooden Vessels...Both Sail and Steam, Built by William H. Webb, in the City of New York From the Year 1840 to the Year 1869. Volume One. William H. Webb, New York.

Wood, Willard M. and Raymond, William T.
1891 Mollusks of San Francisco County. The Nautilus. 5 (5):54-58.

Weinpahl, Robert W., Editor
1978 A Gold Rush Voyage on the Bark Orion From Boston Around Cape Horn to San Francisco, 1849-1850. The Arthur H. Clark Company. Glendale, California.

Wiltsee, Ernest A.
1938 Gold Rush Steamers of the Pacific. The Grabhorn Press, San Francisco.

MANUSCRIPTS:

Anonymous
1849 Engine Plans, S.S. Tennessee and S.S. Cherokee. Photostatic Copy on file at the Smithsonian Institution, Washington, D.C.

Aspinwall, William H.
1848-1850 Letter Book. Photostatic Copy on File at the Henry E. Huntington Library, San Marino, California.

Brown, Robert
1981 Draft Guidelines for Permitting Archaeological Investigations Proposed by the California Coastal Commission. Typescript.

California, State of
1977 Deed to Parcels 1 and 2, Tennessee Valley Unit, Marin Headlands State Park. Photostatic Copy from Book 3194 of Deeds, Page 416, Marin County, in the Land Acquisition files of the Golden Gate National Recreation Area, San Francisco.

Chan, Gordon
1974 Draft, The Marine Resources and Environmental Alternatives for the Natural Resources Management Plan of the Golden Gate National Recreation Area. Xerox Copy on file at the Golden Gate National Recreation Area, San Francisco.

Chapin, E.R.
1874 Reminiscences. Handwritten Manuscript on file at the Bancroft Library, University of California, Berkeley.

Coleman, William T.
1878 Reminiscences. Typewritten Manuscript on file at the California State Library, Sacramento.

- Delgado, James P.
1980 National Register of Historic Places Nomination Form for the Shipwreck Site and Remains of the S.S. Tennessee, Marin County, California. Typewritten manuscript (copy) on file at the Golden Gate National Recreation Area, San Francisco.
- Delgado, James P. and Mayer, Martin T.
1981 Salvage Excavation and Retrieval of Erosion Endangered Historical Archaeological Components Associated with the 1853 Shipwreck of the Steamer Tennessee at Tennessee Beach, Marin Headlands, Golden Gate National Recreation Area, California. Original Typewritten Manuscript on file at the Golden Gate National Recreation Area, San Francisco.
- Forbes, Andrew Bell
1886 Statement. Typewritten Manuscript on file at the Bancroft Library, University of California, Berkeley.
- Gardiner, Robert Ashton, Jr.
1958 The O'Meara-Ashton Saga. Typewritten Manuscript in the Possession of Mrs. Nance A. Webb, Oakland.
- Gustafson, Edward W.
1931 A Study of Sand Movement at the San Francisco Entrance. M.A. Thesis, University of California, Berkeley. On file at the Doe General Library, University of California, Berkeley.
- Hein, Johann (John)
1902 Statement. Typescript Manuscript in the Possession of Mrs. Lois Gilchrist, Penngrove, California.
- King, Ann G.
1974 An Archaeological Survey and Cultural Resource Evaluation of Tennessee Valley and Oakwood Valley, Marin County, California. Typewritten Manuscript on file at the Western Regional Office, National Park Service, San Francisco.
- Lewis, Emanuel R.
1965 A History of San Francisco Harbor Defense Installations: A History of Forts Barry, Baker, Cronkhite, and Funston. Typescript Manuscript Prepared for the State of California Division of Beaches and Parks on file at the California State Library, Sacramento.
- Menu for the S.S. Tennessee
1850 (December 21) Original on file at the Library of the Society of California Pioneers, San Francisco.
- Pacific Mail Steamship Company
1851-1852 Journal Number One. Original bound account book on file at the Huntington Library, San Marino, California.

Pacific Mail Steamship Company

1852-1853 Journal Number Two. Original bound account book on file at the Huntington Library, San Marino, California.

1850 Letter to Mrs. John B. Pierce, Acapulco, April 12, 1850. Original on file in Letters, 1850-1852, Harvard University Library.

Peters, Henry H.

1850 Diary of a Voyage from New York to San Francisco, 1850. Original on file in the Manuscript Division, New York Public Library.

Robinson, Alfred

1850 Correspondence with William Henry Aspinwall. Originals on file at the Bancroft Library, University of California, Berkeley.

Soeten, Harlan

1965 Notes on the Crosstail of the S.S. Tennessee. Photostatic Copy in the files of Mr. William D. Sawyer, San Francisco.

United States Army

1945 Harbor Defenses, San Francisco. Annex D, Underwater Defense. Original Typescript on file at the National Archives, Washington, D.C. Record Group 407, Records of the AGO, Special Projects.

NEWSPAPER ACCOUNTS:

New York Daily Tribune

October 25, 1848

October 27, 1848

March 22, 1849

October 10, 1849

November 8, 1849

November 30, 1849

December 1, 1849

December 7, 1849

Panama Echo

March 12, 1850

March 16, 1850

San Francisco Daily Alta California

April 15, 1850

April 16, 1850

January 15, 1851

May 20, 1851

August 5, 1851

February 13, 1853

March 7, 1853

March 8, 1853

March 9, 1853

March 10, 1853

March 11, 1853

March 14, 1853

March 19, 1853

Sacramento Daily Union (Steamer Edition)
April 15, 1853

San Francisco Golden Era
February 8, 1853

San Rafael Independent Journal
January 25 through May 23, 1916
May 11, 1981
May 12, 1981

San Francisco Chronicle
May 12, 1981

San Francisco Examiner
May 12, 1981

PERSONAL COMMUNICATIONS

Mrs. Elizabeth Ashley, Oakland, California. 1981.

Geophysical Survey Systems Inc. Hudson, New Jersey. 1981.

Mrs. Dorothy S. Gould, San Francisco, California. 1981.

Judd A. Howell, San Francisco, California. 1981.

Professor John Haskell Kemble, San Marino, California. 1981.

Kenneth Lajoie, Menlo Park, California. 1981.

Daniel J. Lenihan, Santa Fe, New Mexico. 1981.

Salem Rice, Oakland, California. 1981.

MAPS AND DRAWINGS:

Anonymous

1853 Disasters of 60 Days. Lithograph Published by Britton and Rey, San Francisco. Copies at the Henry E. Huntington Library, the Society of California Pioneers, and the Bancroft Library.

Austin, H.
1873 Map of Marin County, California. Published by A.L. Bancroft and Company, San Francisco. Original on file at the Bancroft Library.

Dodge, George M.
1880 Map of the Rancho Sausalito to Accompany Report of References in the Case of Gould vs. Throckmorton et al. Original on file at the Sausalito Historical Society, Sausalito, California.

Lawson, Andrew C.

1914 Geologic Atlas of the United States, San Francisco Folio: Tamalpais, San Francisco, Concord, San Mateo, and Haywards (sic) Quadrangles. United States Geological Survey, Washington, D.C.

Totten, George M.

1853 Wreck of the S.S. Tennessee. Lettersheet Published by the Sacramento Daily Union Office, Sacramento. Original on file at the Wells Fargo Bank History Department and Archives, San Francisco.

United States Army Engineer Office

1942 Harbor Defenses of San Francisco, Elk Valley, California. Fire Control Station M4, Location Plan. May 24, 1942. Original on file at the Presidio Army Museum, Presidio of San Francisco.

United States Army Engineer Office

1943 Forts Barry & Cronkhite, California, Mine Cable Line, Casemate M1 to Elk Valley, Profiles. June 19, 1943, Drawing Revised to Conform to Completed Construction December 1943. Original on file at the Presidio Army Museum, Presidio of San Francisco.

United States Army Engineer Office

1943 Harbor Defenses of San Francisco, Fort Cronkhite, California. Elk Valley Cable Sub Hut. June 19, 1943. Drawing Revised to Conform with Completed Construction October 5, 1943.

United States Army Engineer Office

1943 Harbor Defenses of San Francisco, Forts Barry & Cronkhite, California. Mine Cable Line, Casemate M1 to Elk Valley, Location Maps. June 19, 1943. Drawing Revised to Conform to Completed Construction December 1943. Original on file at the Presidio Army Museum, Presidio of San Francisco.

United States Army Engineer Office

1943 Harbor Defenses of San Francisco, Elk Valley, California. Power Installation Plot Plan, December 9, 1943. Drawing Revised to Conform to Completed Construction, April 1944. Original on file at the Presidio Army Museum, Presidio of San Francisco.

APPENDICES



APPENDIX A: Listing in the National Register of Historic Places



ENTRIES IN THE NATIONAL REGISTER

STATE CALIFORNIA

APR 14 1981

Date Entered

Name

Location

Steamship Tennessee Remains

Marin City vicinity
Marin County

Also Notified

Honorable Alan Cranston
Honorable S. I. Hayakawa
Honorable John L. Burton
Mr. David F. Hales,
Deputy Assistant Secretary for
Fish and Wildlife and Parks

State Historic Preservation Officer
Dr. Knox Mellon
Office of Historic Preservation
California Department of Parks &
Recreation
P.O. Box 2390
Sacramento, California 95811

For further information, please call the National Register at (202)343-6401.



APPENDIX B: Federal Compliance



IN REPLY REFER TO:

H4217

(WR)RC

United States Department of the Interior

NATIONAL PARK SERVICE

WESTERN REGION

450 GOLDEN GATE AVENUE, BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

January 13, 1981

✓	GEN SUPT
✓	ASST GEN SUPT
✓	ASST ASST
✓	PLANNERS
✓	PUBLIC INFO
✓	ADMIN OFF
✓	PERSONNEL
✓	ENVR COMPL
✓	MAINTENANCE
✓	PIER 1
✓	INTERP
✓	PARK POLICE
✓	S.F. UNIT MGR
✓	MARIN UNIT MGR
✓	PERMIT OFF
✓	SAFETY OFF
✓	RECREATION
✓	YCC/YACC
✓	CONCESSIONS
✓	MARKET MUSEUM
✓	HYDRO ST PIER
✓	DELCADO
✓	MANAGER

H-3015 Tenn

Memorandum

To: Superintendent, Golden Gate

From: Chief, Cultural Resource Management, Western Region

Subject: Compliance For Undertaking, Historic Preservation
Legislation, Programmatic Agreement
(NPS, Advisory Council, Conference SHPO's)

Enclosed is a copy of the Assessment Of Actions Having An Effect On Cultural Resources for a proposed undertaking in your area. The specific undertaking is: Number: 34 WR

Electro Magnetic, non-destructive, sub-surface survey of Tennessee Beach
to document the extent of ferric remains of the S.S. Tennessee

The proposed undertaking should be accomplished in accordance with the methods set forth in the form. The Advisory Council or State Historic Preservation Officer reserve the right to object in a timely manner.

The enclosed form should be added to records on the undertaking as basic documentation; approval by the Regional Director and compliance with the National Historic Preservation Legislation.

Thomas D. Mulhern, Jr.

Thomas D. Mulhern, Jr.

Enclosure

cc: WASO-560 Assistant Director, Cultural Resources, w/c enc.

JAN 15 11 19 AM '81
NAT. REC. AREA
GOLDEN GATE
RECEIVED

Year of
the
Visitor



ASSESSMENT OF ACTIONS HAVING AN EFFECT ON CULTURAL RESOURCES

Enclosure 3

(Attach continuation sheets as necessary)

WR: 34

A. Originating Office

1. Park: Golden Gate National Recreation Area

2. Description of proposed action: ☐ Energy Management Action; ☐ Handicapped Access; ☐ Action under PMA; ☐ Section 106 Action not under PMA (Region to fill in blocks).

Electro Magnetic, non-destructive, sub-surface survey of Tennessee Beach to document the extent of ferric remains of the S.S. Tennessee.

3. Explain why the action is needed: One large metal object is presently on the beach. The 9' long crosshead with two attached connecting arms (5' long) lie near the high water mark in the south $\frac{1}{4}$ of the beach. The remains of this vessel have been nominated to the National Register of Historic Places and we need to document the extent and location of the other portions of the vessel and its propulsion system, ie; steam cylinder, boilers, and engine block. The ultimate plan is to excavate, stabilize and exhibit the remains of this early example of a commercially developed steam propulsion system.

4. Cultural resources affected by proposed action (name and LCS number, if applicable):

Components of the propulsion system will be located by non-destructive remote sensing and limited excavation will be made to determine the nature of the magnetic anomalies recorded.

5. In affecting cultural resources, the proposed action will (check as many as apply):

- ☐ Destroy historic fabric.
- ☐ Remove historic fabric.
- ☐ Replace historic fabric in kind.
- ☐ Replace missing historic fabric.
- ☐ Add nonhistoric elements to a historic structure.
- ☐ Remove nonhistoric elements from a historic structure.
- ☐ Alter historic terrain, groundcover, or vegetation.
- ☐ Introduce nonhistoric elements (visible, audible, or atmospheric) into a historic setting or environment.
- ☐ Reintroduce historic elements in a historic setting or environment.
- ☐ Remove historic elements from a historic environment.
- ☐ Remove nonhistoric elements from a historic environment.
- ☐ Disturb, destroy, impair, or render inaccessible archeological (surface or subsurface) resources.
- ☒ Possibly disturb presently unidentified archeological resources or historic fabric.
- ☐ Incur gradual deterioration of historic fabric, terrain, or setting.
- ☒ Other (Describe briefly): Locate historic resource for possible future removal

Describe the indicated effect(s) concisely: Hand excavation of beach sand to shallow depth 0-2' to determine nature of detected magnetic anomaly. Possibly mechanical excavation of beach sand to evaluate deeply buried 6-12' magnetic anomaly by auger or backhoe.

Yes No

6. The proposed action is limited to preservation maintenance ☒. If not, identify supporting approved plan(s), comment and/or action thereon by Advisory Council on Historic Preservation, dates of ACHP action and NPS approval, and section(s) of the plan(s) pertaining to the action. If none, so state: None

Assessment of Effect
January, 1980

7. Identify any important relationships between the proposed action as it affects cultural resources and pertinent NPS management policies, standards, and guidelines: This action is needed to implement management policies for park planning. Information Base II-1, Inventory of Cultural Resource V-4 and List of Classified Structures V4.
8. Describe any measures planned to minimize or lessen the loss or impairment of historic fabric, setting, integrity, or data: Supervision will be by Regional Archaeologist and any large artifacts located will be left in place. Small artifacts will be located on plan and elevation if removed to preserve their relationship to other remains.
9. Identify supporting study data and date(s) of preparation (attach if feasible): Memorandum dated 9-3-80 to Chief, Resource Management and Planning, GGNRA, from Park Historian and Archaeologist, subject, initial archaeological reconnaissance, S.S. Tennessee remains.
10. Prepared by: M. J. Mares Title: Cultural Resource Specialist
11. Signature of Park Superintendent: Chipman J. Watts 5/12/81

Regional Professional Review and Certification

1. The foregoing assessment of effect is adequate; the proposed action is consistent with all applicable NPS management policies, standards, and guidelines reviewed and concurred in by the Advisory Council; and the proposal incorporates all feasible measures to minimize adverse effects to cultural resources.
2. The proposed action is limited to preservation maintenance or it is authorized by an approved planning document reviewed and concurred in without relevant exceptions by the Advisory Council.

	Yes	No	N/A		
(Negative certifications must be justified on attachments.)	1 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Roger E. Kelly</u>	<u>1/12/81</u>
	2 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Regional Archaeologist	Date
[] Energy Consultation Held	1 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Gordon S. Russell</u>	<u>1-12-81</u>
	2 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Regional Historian	Date
Regional Energy Coordinator	1 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Robert M. Cox</u>	<u>12 Jan 1981</u>
	2 <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Regional Historical Architect	Date

Additional requirements of the proposed action:

Regional Director Approval of Proposed Action Including Additional Requirements

- [] The proposed action, including any additional requirements stated above, meets all conditions in B.1 and 2, or is an Energy Management Project meeting only conditions in B.1, and therefore, satisfies the requirements of Section 106.

1/13/81 John H. McLaughlin
Date Regional Director

WASO Record

Assessment received and noted:

Assistant Director,
Cultural Resources

Date



APPENDIX C: State Compliance Guidelines



STATE LANDS DIVISION

7 13TH STREET
SACRAMENTO, CALIFORNIA 95814



California Administrative Code
Title 2, Administration
Division 3, State Property Operations
Register 77, No. 6
Effective 3/1/77

ARTICLE 2.5

SALVAGE PERMITS FOR ABANDONED PROPERTY

2050. CHARACTER AND EXTENT OF LANDS AND PROPERTY.

(a) Lands subject to permit include all ungranted tide and submerged lands subject to the jurisdiction of the Commission.

(b) Property subject to permit includes all abandoned property over and upon ungranted tide and submerged lands of the State which is the property of the State and under the jurisdiction of the Commission.

2051. DURATION OF PERMITS.

Salvage permits are limited to a period not exceeding one (1) year, extendable for a period of an additional one (1) year at the discretion of and upon such reasonable terms and conditions as may be imposed by the Commission.

2052. SALVAGE PERMIT PROCEDURES.

(a) Applications. Any person desiring to apply for a salvage permit on or upon any ungranted tide and submerged land under the jurisdiction of the Commission shall file with the Commission a written application containing:

(1) Name, address and status of citizenship of applicant; if applicant is a corporation, the corporate name and name of president, secretary, and officer authorized to execute contracts and permits;

(2) A description of the State lands upon which salvage operations will be conducted;

(3) A statement describing the method and conduct of the salvage operation;

(4) A statement of the duration of the salvage operation;

(5) An explanation of why the applicant claims the property to be in an abandoned state.

(6) A description of the nature of the abandoned property sought to be salvaged by the applicant;

(7) An environmental impact report (EIR) or environmental impact statement (EIS) if required under the guidelines of the California Environmental Quality Act (CEQA).

(b) Applications for permits under this article shall be filed with the State Lands Division, 1807 - 13th Street, Sacramento, California 95814.

(c) The application shall be accompanied by a filing fee, as provided in Section 1903(a), and a rental deposit equal to the amount of twenty-five dollars (\$25.00) per acre for each acre or fraction thereof within the desired permit area. In addition, if the salvor is permitted to keep the material salvaged, he shall pay in addition to the annual rent an amount equal to 25% of the net salvage value of \$25,000 or less; and 50% of the net salvage value in excess of \$25,000. If the State retains all or any part of the salvaged items, the State shall pay to the salvor the net salvage value of any items retained, less the percentage rental that the State would have received, had the item been sold by the salvor. However, the Commission reserves the right to accept such other consideration as may be deemed by the Commission to be in the best interests of the State.

(d) Permit forms shall be submitted for the applicant's acknowledgment or witnessed execution prior to placement on the Commission's agenda.

2053. SALVAGE PERMITS.

(a) This category includes permits granted pursuant to the provisions of Section 6309 of the Public Resources Code.

(b) All abandoned property over and upon ungranted tide and submerged lands of the State shall be the property of the State and under the jurisdiction of the Commission.

(c) The Commission may retain any salvaged items, may sell all or any part of them, or may, subject to appropriate consideration, permit the applicant to keep them.

(d) Salvage value shall be determined by competent appraisers, approved by the Commission, who are qualified to assess the fair market value of the salvaged items.

(1) If an agreement as to fair market value cannot be reached, the dispute shall be submitted to a mutually agreeable party for appraisal.

(2) All costs for appraisals shall be borne by the salvor.

(e) For purposes of these regulations, the term "net salvage value" shall be defined as the sales price of any items salvaged, whether for cash or on credit and whether or not payment has been made, or the fair market value of any item salvaged but unsold at the termination of this permit, less a deduction for the permittee's costs directly attributable to the salvaging thereof.

(1) Costs in the nature of fixed overhead may not be deducted in whole or in part. To the extent that they are variable and directly attributable to the salvage operations contemplated by this permit, the following costs of the permittee may be included as deductions from sales price or fair market value:

(A) Wages and salaries;

(B) Contributions to Federal, State, and union funds for the benefit of employees;

(C) Costs of routine maintenance and repair of equipment used in said salvage operations;

(D) Costs of merchandise, supplies, and materials consumed in said salvage operations;

(E) Expenses incurred in selling any items salvaged;

(F) Any other items of variable cost incurred in connection with said salvage operations which are directly attributable to said salvage operations;

(G) Neither depreciation nor State or Federal income taxes may be deducted.

(2) That portion of the rental computed as a percentage of net salvage value shall be due and payable on the first of each month following the sale (or on the first of the month following termination of the permit, regarding unsold items) and shall bear interest at the rate of seven percent (7%) per annum if not paid within fifteen (15) days of the due date.

APPENDIX D: Correspondence

POMONA COLLEGE
CLAREMONT, CALIFORNIA 91711

DEPARTMENT OF HISTORY

5 January 1981

Mr. James P. Delgado
Park Historian
Golden Gate National Recreation Area
San Francisco
California

Dear Mr. Delgado:

Thank you for your letter of November last and for sending me the the nomination form for the wreck of Tennessee for inclusion on the National Register of Historic Places as well as the drawings and photograph of the parts of her side lever engine which are on the beach at Tennessee Cove. This is all most interesting to me, and I will look forward to keeping in touch with further developments regarding the wreck. It would seem to be of great importance to generate funding for excavation of the beach to recover as much of the engine as possible with a vew to its eventual restoration and reassembly and its exhibition, perhaps powered by electricity, in the muswum in San Francisco. As far as I am aware, there is no other example of this type of marine engine in existence.

Have you seen the plans of Tennessee contained in William H. Webb's Plans of wooden ships? ~~It~~ They would certainly belong in your materials on the ship, and might be useful in some future restoration of parts of the wreck, if they survive, or in the construction of a model of the ship. The book is a rare one, but there is a copy in the University of California Library at Berkeley, the Huntington Library has one, and if these sources do not produce a photo-copy for you, I own one which might be used.

I will certainly keep an eye out for additional information on Tennessee which might be of use to you. It was a pleasure for me to meet and talk with you at the San Jose meeting. On some occasion, when I am in the Bay Region, I would greatly appreciate having a chance to visit Tennessee Beach to see the remains of the engine there.

Sincerely,

John H. Kemble
John H. Kemble

FILE COPY

THE NATIONAL MUSEUM OF AMERICAN HISTORY

Smithsonian Institution · Washington, D.C. 20560

January 12, 1981

FILE COPY

Mr. James P. Delgado
Park Historian
National Park Service
Golden Gate National Recreation Area
Fort Mason
San Francisco, California 94123

Dear Mr. Delgado:

Mr. Ripley has asked me to respond to your letter regarding the engine from the Tennessee. The recovery of this artifact is altogether worthwhile, and we wish you all possible success. I am afraid, however, that our experience with the Indiana is not directly pertinent. First, the Indiana project was a deep-water operation, with the twin keys to its success being the cooperation of the Navy divers and the Corps of Engineers. Though the great depth at which the divers had to work was a distinct handicap, the fact that the engine was pinpointed as to exact location and entirely visible rendered the salvage considerably easier than what you are contemplating. Moreover, the ravages of salt water are not likely to have left anything as well preserved as you can see the Indiana was from the enclosed photos. In other words, ocean salvage in shoal waters--perhaps especially in shoal waters--is simply not going to be as readily facilitated nor as rewarding in terms of the condition of the recovered artifacts.

Now, having sketched the pessimistic side, let me suggest that the picture is not entirely bleak. As you probably know, several ocean-water recovery projects on the east coast are at one or another stage of planning. The one most analogous to what you contemplate concerns the Savannah, off Long Island. Indeed, the physiographic situation seems virtually identical. There are a number of interested parties, but I might suggest that you contact Frank Braynard, who is the professional historian most directly involved. Frank's address is 98 DuBois Avenue, Sea Cliff, New York 11579. Further, in anticipation of some of the problems you may face upon eventual recovery, you might also get in touch with the LaQue Center for Corrosion Technology, Box 656 Wrightsville Beach, North Carolina 28440. The Center runs an annual meeting of the Sea Horse Institute, which has lately involved itself with matters of historic preservation as well as more current commercial concerns.

Mr. James P. Delgado

2.

January 12, 1981

I trust that this may be of some help for a start, and that you may at least begin to define the dimensions of your operation. To repeat, it is altogether worthwhile, and I wish you all good fortune. Please keep me posted on your progress.

Sincerely,

Robert C. Post

Robert C. Post

Curator

Section of Maritime History

Enclosure

OFFICE OF HISTORIC PRESERVATION

DEPARTMENT OF PARKS AND RECREATION

POST OFFICE BOX 2390

SACRAMENTO, CALIFORNIA 95811

January 27, 1981

Howard Chapman, Regional Director
 Western Region
 National Park Service
 450 Golden Gate Avenue, Box 36063
 San Francisco, CA 94102

Dear Mr. Chapman:

National Register of Historic Places Nomination for the Remains of the S.S.
 Tennessee, NPS/GGNRA, Marin County, California

Thank you for the opportunity to review the referenced document.

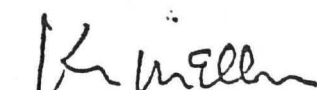
The nominated property is unquestionably one which, when further defined, will create substantial excitement. Indeed, it has already generated considerable interest in this office. The importance of the Tennessee is beyond dispute both in terms of historical associations (Criterion A) and possibly, archeological potential (Criterion D). Conceivably, Criterion C might also prove relevant.

Having described our reaction as one of enthusiasm, we should also add that we have some misgivings. Evidence of the ship's engines has been established, and reports of past observations have been adduced in the nomination. But it is difficult to say with confidence just how much has survived and the extent of the promise the surviving remains may have once they are adequately defined. It is clear that we do not have answers to these important questions at this time.

Please regard these statements not so much as doubts or reservations but as our way of encouraging the Park Service to develop an approach toward determining just how much of this resource has survived and what promise it holds for scholarly pursuits and public education. Much basic work remains to be done and we hope that it can be done.

I am signing the nomination in recognition of the potential value which exists at the site. I hope that much more may be forthcoming.

Sincerely,



Dr. Knox Mellon
 State Historic Preservation Officer

Enc.

EDMUND G. BROWN JR. Governor	
RECEIVED	
Western Regional Office	
JAN 30 1981	
Regional Director	
Dep. Regional Dir.	
Operations Div.	
Administration	
Operations	
S.S. Mgmt. Plan	
EEO	2/2/81
Public Affairs	
Action taken	



FILE COPY

THE NATIONAL MUSEUM OF AMERICAN HISTORY

Smithsonian Institution · Washington, D.C. 20560

RECEIVED
GOLDEN GATE
NAT. REC. AREA

FEB 2 1 11 PM '81

H-3015

TEN 14

28 January 1981

Mr. James P. Delgado
Park Historian
National Park Service
Golden Gate National Recreation Area
Ft. Mason, San Francisco, CA 94123

Dear Mr. Delgado:

Many thanks indeed for your interesting letter of the 21st describing the side-lever engine of the Tennessee. I was delighted to learn of this, to know that there is continuing interest in its ultimate exhumation, and that the salt environment has not wrought the damage to the iron that often occurs.

I have passed on to Carol Poh Miller, Editor of the SIAN, copies of your letter and the National Register nomination form, expecting that she will wish to bring the project to the industrial-archeology community by means of an article. In that vein, is there available a photo showing the exposed crosstail? (That seems, incidentally, to have been the term used, although I imagine that crossfoot is an alternate.)

I'm sure that you or Harlan Soeten must have seen the enclosed photocopy drawings of the engine, but here is another set just in case. I found them in my files, but unfortunately the reference is not noted.

For his interest, I sent copies of all this on also to Robert C. Post, the Museum's Curator of Marine Transportation in the event that he might be able to add anything. It is an interesting coincidence that the Tennessee engine is a contemporary, to the year, of the Indiana engine (and boiler) recently recovered by us from Lake Superior. For your interest, I'll ask Dr. Post to send you some matter on that subject.

With all best wishes.

Sincerely,



Robert M. Vogel
Curator
Division of Mechanical
& Civil Engineering

cc: Robert Post



FRANK BRAYNARD, Chairman
NORMAN GLADNEY, President

919 THIRD AVENUE · NEW YORK, N.Y. 10022 · (212) 752-7150

February 2, 1981

Mr. James P. Delgado
Park Historian
United States Dept. of the Interior
National Park Service
Golden Gate National Recreation Area
Fort Mason, San Francisco, CA 94123

Dear Mr. Delgado:

So happy to hear from Robert C. Post via your good letter of January 20. Hope to be helpful. I am writing from my New York office (see attached OP SHIP brochure), as I am only at the Museum in Kings Point two days a week. Your efforts to find the engine of the TENNESSEE are certainly most important and anything I can possibly do to help, I will most certainly do. I have often joked about trying to find the condenser of the SAVANNAH, which was on display in the 1850s in the N.Y. Crystal Palace. As you know, the Crystal Palace burned down, and the remnants of the condenser are mixed in the rubble under the N.Y. Public Library, built on the site.

As to how we are going about the search for the wreck of the SAVANNAH, herself, here are some thoughts: A thorough historical search is needed. My search uncovered many things, including a dozen contemporary newspaper clippings about the wreck. Finally, all the items I discovered I put into my book called S.S. SAVANNAH, THE ELEGANT STEAM SHIPS, published in 1961 by the Univ. of Ga. Press. It is out of print, but I hope that the Savannah Museum of the Sea is going to put out a new edition. I have given them all rights to do this. On the fiscal side - every kind of effort is needed to raise money. We have half a dozen funding applications in the hands of various groups and expect to send out one with each rejection we receive. Slow but sure. This, plus publicity (see attached clip). Try every possible way to get publicity. Do not listen to those who advise you to hold back on publicity. Every newspaper notice helps. Just make sure they spell your name correctly. Then get allies. We have the top water

"The sea is a world of entertainment"

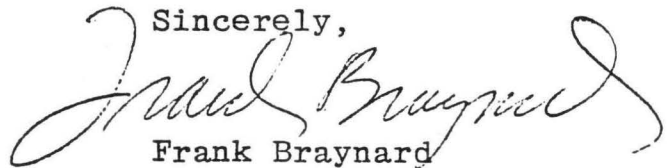
Television Programming · Motion Pictures · Books and Publications · Sea Pageants

Mr. James P. Delgado
Park Historian
U.S. Dept. of the Interior
National Park Service
Golden Gate National Recreation Area
Fort Mason, San Francisco, CA 94123
Page 2

resources scientist professor at Queens College, the Explorers Club, the U.S. Merchant Marine Academy, and American Heritage Magazine all helping us. Then, be sure you know the best, latest scientific devices that can be used to locate the engine, despite their cost. Write when you can and good luck.

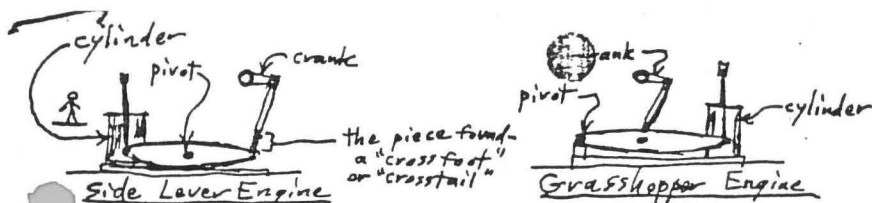
Also, attached is a 4 page project memo to my partner in OP SHIP, Norman Gladney. I wrote it about the creation of a national touring exhibition on the two SAVANNAHs...it may fly - as they say. I want you to know about it. You might try a similar thing re: TENNESSEE.

Sincerely,

A handwritten signature in cursive script, reading "Frank Braynard". The signature is fluid and stylized, with the first name "Frank" being more prominent and the last name "Braynard" following in a similar cursive style.

Frank Braynard

FB:ac
Enc.



1010 BOLD ST.

San Francisco, CA 94109

8 Feb 1981

James P. Delgado, Historian
Golden Gate National Recreation Area
Fort Mason
Building 201
San Francisco, CA 94102

Dear Jim —

Thanks for sending the drawings of Tennessee's engine — they're a real find. Did the Smithsonian say where these lithographs came from? Were they in a book or as individual sheets? A quick study shows Tennessee's engine to be lightly built compared with the Collins line steamer Arctic and especially with the ^{early} British side lever engines with their heavy, cast iron frames. Both U.S. and British builders adopted wrought-iron frames, about this time, to save weight. Tennessee's engine has a light wrought iron tie between cylinder and crankshaft and seems to have only wood beams for a bed plate, thus the engine could have broken into several pieces. Tennessee's arrangement is unusual and is the only side lever engine I've run across with the valves on the side of the cylinder away from the crank, instead of jammed between the side levers. This gave easy access to valves and valve gear but also meant the engine took up more room in the ship.

I've figured out a scale for these drawings and the crossfoot found in Marin County matches closely with the drawings in both shape and size. The scale of the side elevation is smaller than that for the end elevations.

Tennessee's engine is a true side lever type (see sketch above), as used in the earliest ocean-going steam vessels and not a grasshopper type, as used in British paddle wheel tugboats, such as Epplenon Hall.

I believe that Tennessee's engine is worth some exploratory digging to find more pieces. Its significance is as follows —

A. It is a rare example of an early (1849), U.S. built marine engine. The only comparable is that of the Great Lakes steamer Indiana, raised recently by the Smithsonian and the Mississippi River Gunboat Cairo at Vicksburg. Those two are not ocean going types.

B. It's a unique example of a large, early, ocean going side lever engine. This was the first standard type of marine engine and it powered the early Collins line Cunard liners and many others before giving way to more compact types of steam engine.

C. It's an example of American workmanship. It was built by the Novelty Works, New York, 1849, one of the largest engine builders of that time.

D. It's a surviving relic from a Gold Rush steam vessel.

E. As an exhibit, it would fit in well with other, later marine steam engines at the National Maritime Museum, such as the Evreke's beam engine and the triple expansion engines of Hercules, Wapama and Jeremiah O'Brien.

Sincerely —





United States Department of the Interior

NATIONAL PARK SERVICE

GOLDEN GATE NATIONAL RECREATION AREA
FORT MASON, SAN FRANCISCO, CALIFORNIA 94123

IN REPLY REFER TO:

H3015 (GOGA)

October 13, 1981

Mr. Robert C. Harris, Chairman
Distribution Committee
The San Francisco Foundation
425 California Street, Suite 1602
San Francisco, California 94104

Dear Mr. Harris:

I am writing in support of a very worthy project which will soon be starting in the Marin Headlands unit of the Golden Gate National Recreation Area. Since August of 1980, our staff has been working with a dedicated group of volunteer archeologists and historians to document the extent of the remains of the Gold Rush steamer Tennessee, which was wrecked on the Marin coastline on March 6, 1853. Their efforts to provide a complete historical and archeological understanding of the ship and its remains will provide us with a means for the better management and preservation of this significant cultural resource. It will also do the same for the State of California, which administers part of the site.

Documentation of the site through the sophisticated and detailed methods proposed by the volunteers is expensive and cannot be funded by the National Park Service due to our budget restrictions. But it remains an important task and a priority for our cultural resource management team. We are hoping that you can help fund this project, which is being presented to the San Francisco Foundation for financial assistance.

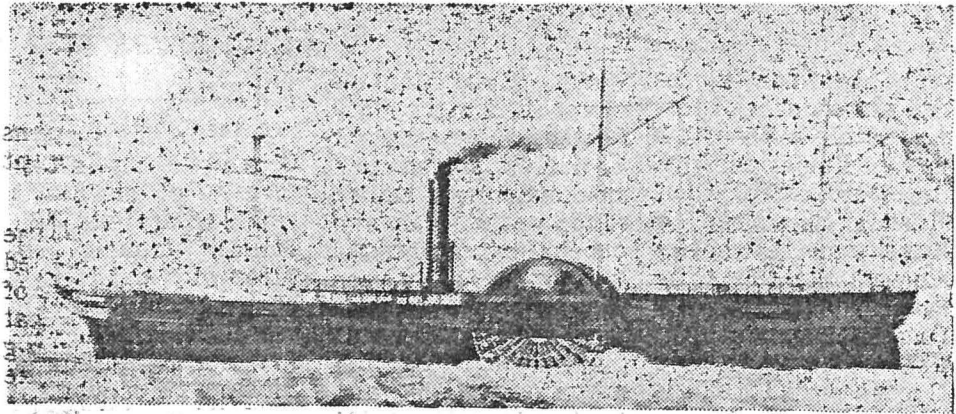
The results of this project will be impressive with a well researched, academically professional and modern product helping us in our mandated task of protecting significant resources and interpreting their values to the public.

Sincerely,

William J. Whalen
General Superintendent

APPENDIX E: Publicity

D8 S.F. Progress **Wed., May 13, 1981**



National Park Service photo

OUT OF THE PAST — About 400 relics of this ship, the SS Tennessee, have been recovered from the Marin headlands cove where she was wrecked in a fog on March 6, 1853. The National Park Service says Tennessee Cove, four miles north of the Golden Gate, is now a historic site. With volunteer help, the NPS plans limited further excavation. Workers already have found handblown bottles, brass spikes, copper nails, and a porthole. The huge steam engine, believed intact, has been located underwater close inshore. No lives were lost when the Tennessee piled up. All 14 chests of gold bullion aboard were removed by Wells Fargo Co.



Porter Shaw Library



Examiner/Sid Tate

DIGGING UP REMAINS OF A GOLD-RUSH STERNWHEELER
Tennessee Cove was named for the ship that went aground

'49er ship found sunk in the sand

The wreckage of a Gold Rush sidewheeler steamship has been located in a remote Marin County cove, the National Parks Service announced.

The Tennessee ran aground at what is now called Tennessee Cove on March 6, 1853, about four miles northwest of the Golden Gate.

It had been feared that fierce currents had broken up the ship beyond recognition, but in recent years the Parks Service began to believe that some wreckage might be found. Since last Oct. 1, parks workers and volunteers have been working to locate the remains of the wooden ship.

They found much of it intact, they said at a news conference, including its large cast-iron engine.

William Whalen, general supervisor of the Golden Gate National Recreation Area, said at a news conference there are no plans to salvage the sidewheeler, although about 400 artifacts have been taken for study.

Whalen said the cove had been named to the National Register of Historic Places because of the find. He added that no relic-hunting would be allowed.

The Tennessee went aground on a little beach after missing the Golden Gate in dense fog. The cargo, including 14 chests of gold, was removed to the beach. Historians report rescue was prompt. Boats were unable to pull the ship off the beach, and she broke up.

The ship was launched in 1848 on the Atlantic Coast for the New York and Savannah Navigation Co. The next year, it brought gold seekers to San Francisco for the Pacific Mail Line.

Independent Journal

Vol. 121/No. 43

A Gannett newspaper

Marin County, California, Monday, May 11, 1981

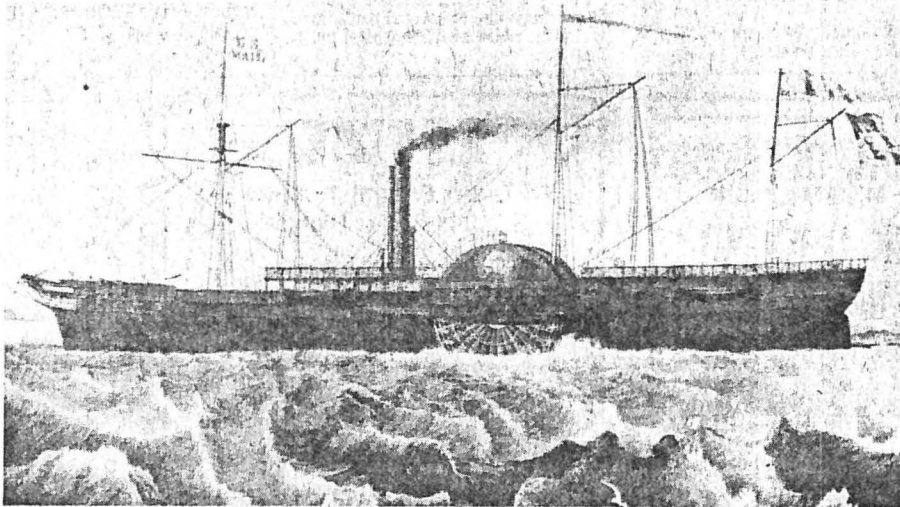
883-8600 — \$4.50 a month by carrier

20¢

Shipwreck of Tennessee Cove located

By Jeff Greer

Of the LJ staff



Steamer Tennessee carried fortune seekers before it sank at Marin Headlands

The wreckage of a Gold Rush era ship that gave Tennessee Cove its name was publicly pinpointed this morning for the first time in more than a century.

National Parks Service workers, volunteer archaeologists and diving buffs have been working secretly for months to locate what's left of the old sidewheeler steamship Tennessee, which ran aground at the cove on March 6, 1853.

Early today, park service workers planned to remove part of the mantle of sand that covers the wreckage, so it could be seen at low tide at midmorning. The next high waves are expected to cloak the ship's bones with sand again.

Golden Gate National Recreation Area officials held a press conference today in the remote cove four miles northwest of the Golden Gate.

William J. Whalen, GGNRA general superintendent, announced that the find has earned Tennessee Cove

special recognition in the National Register of Historic Places.

National Park Service officials and historians have known for about 10 years that some wreckage still might be found underwater in the cove, but the search did not begin until last October. Golden Gate National Recreation Area staff members volunteered for the hunt, aided by Marin and San Francisco amateur divers and hobbyists using sensitive electronic metal detectors.

They found that most of the vessel still is there, not swept away by Golden Gate currents.

The ill-fated Tennessee was not seriously damaged when it grounded on the little beach, nor were its passengers in any dire danger. They and the crew removed most of the cargo and all 14 chests of gold to the beach and awaited rescue, which was prompt, historians report. Wells

See Shipwreck, page A8

Shipwreck Site Goes On the Map

By Dale Champion

Until she lost her way in heavy fog and wrecked 128 years ago on the Marin County coast, the steamship Tennessee ploughed the Pacific between Panama and San Francisco, bringing thousands of fortune-hunters bound for California's goldfields.

Her glittering past and the lore of her disastrous end were recalled yesterday with the announcement that cliff-girded Tennessee Cove, where the side-wheel ship crashed ashore, has been added to the National Register of Historic Places.

The cove, four miles north of the Golden Gate, is now part of the Golden Gate National Recreation Area.

Since January, park specialists and volunteers have been systematically combing the cove area for bits and pieces of the Tennessee. About 300 fragments have been recovered — including hand-blown bottles, shards of window panes, a porthole frame, brass spikes, copper sheathing nails and parts of her steam engine.

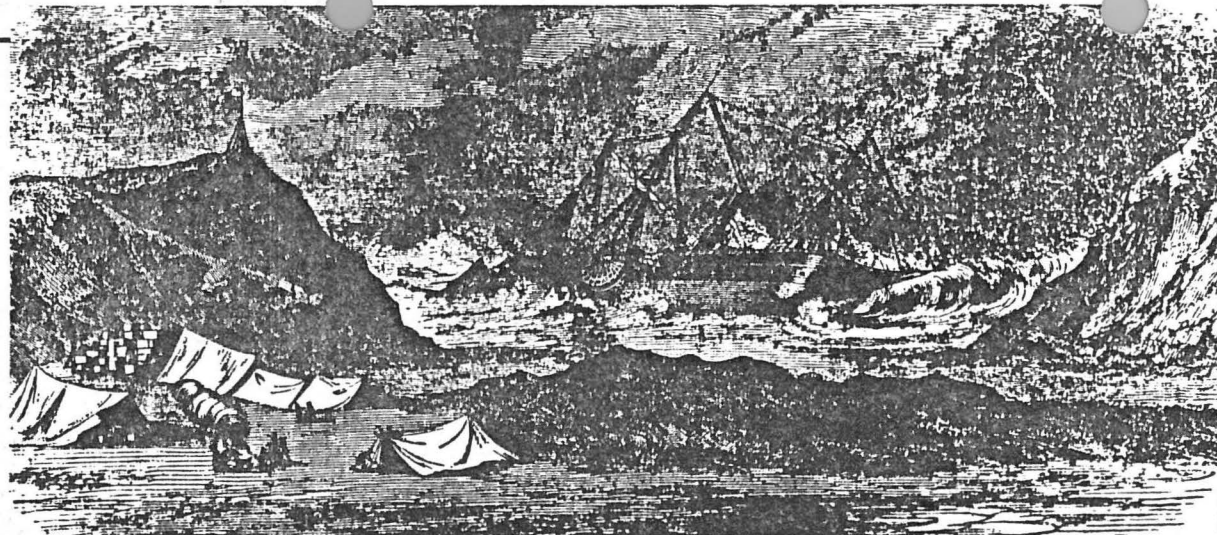
"This is really exciting for us," said park historian James Delgado, "both because of the fascinating history of the Tennessee and because we're finding the remains of the earliest known American-built marine steam engine."

Delgado said a metal detection survey has indicated that the huge cast iron engine lies largely intact underwater at the edge of the cove, but there are no plans to salvage it.

Park Superintendent William J. Whalen said many fragments of the Tennessee will be placed in storage for eventual display in the new national maritime museum planned for San Francisco.

"We want the public to be able to appreciate a part of the rich history and culture, especially the maritime lore, of the greater Bay Area," Whalen said.

Launched in New York in 1848, the 120-foot Tennessee first ran between New York and Savannah. A year later, following the discov-



Engraving shows the wreck of the Tennessee in March 1853; her engine lies in Tennessee Cove



By Vincent Maggiora

ery of gold in California, she was acquired by the Pacific Mail Steamship Co., re-outfitted and brought around Cape Horn for passenger service.

Gold seekers were pouring across the Isthmus of Panama to the Pacific side and there was great demand for ships to carry them to San Francisco.

In July 1850, the Tennessee began running between Panama

and San Francisco, making a round trip every 15 days. A fast sailer with a reputation for having good food, she commanded rates of passage as high as \$300 for a stateroom, \$175 for an open cabin and \$100 for steerage. She could accommodate up to 550 passengers, along with a cargo of gold, merchandise and mail.

She met her end on the morning of March 6, 1853, while inbound from Panama. The night before,

she lay off the Farallones, buried in dense fog. In the morning, her skipper, believing the fog would burn off near shore, started easing the Tennessee toward what he thought was the Golden Gate.

Crew men took soundings to guide the steamer.

What the captain of the Tennessee, a man named E. Mellus, didn't know was that he actually was heading into the cove that now

bears the vessel's name. Near shore, with the fog still thick, the ship misread a rocky cliff for Lime Point, the north anchor now of the Golden Gate Bridge. By then, the ship's fate was sealed.

Passengers began to scream that the shoreline was dead ahead.

Captain Mellus, seeing he had only one possible choice for averting disaster, ordered full steam ahead, with the hope of running his ship on the beach. He succeeded at that, without the loss of a single life or any part of the cargo.

Despite repeated attempts to haul the Tennessee off the beach, her hull was driven deeper into the sand and she soon was battered to pieces by the heavy surf.

When the Tennessee hit shore, a Wells Fargo agent aboard lowered a small boat and took ashore 14 chests of gold. After that women and the rest of the passengers were landed.

Among them were a number of well known persons of the day, including Peter Skeen Ogden of Oregon, Mayor Josiah Belden of San Jose and Hiram Tubbs, who with his brother, Alfred, would later found the Tubbs Cordage Co., the first rope manufacturing firm on the Pacific Coast.

Another of the passengers was William Tell Coleman, who went on to organize the two San Francisco Vigilante Committees. Aboard ship with him was James Stuart, who was destined to be the first man hanged by the Vigilantes.

Shipwreck

From page A1

Fargo kept close watch on the gold.

The ship's heavy, cast-iron engine is believed to be largely intact. But the Park Service has no plans to try to remove it, Whalen said.

The engine is the oldest known example of its type in the United States, historians report. It and an identical engine for the Tennessee's sister ship, the Cherokee, were built by the Stillman, Allen & Co. Novelty Works in New York in 1848. The engine drove a heavy walking beam that was placed low in the engine-room, rather than above decks as in some other vessels of the era. The beam in turn drove a huge paddle-wheel on each side of the ship.

The Tennessee, launched Oct. 26, 1848, began its career on the Atlantic Coast, for the New York and Savannah Navigation Co.

The Pacific Mail Line bought the sidewheeler in 1949 and used it to carry passengers from Panama to San Francisco during the Gold Rush. Passage cost from \$300 for a stateroom to \$100 for "a dry bed and fast passage" in steerage. Competitors had cheaper fares, but the Tennessee had a reputation for giving its passengers sumptuous meals while they impatiently waited out the coastal voyage from Central America to the Golden Gate.

Records indicate the Tennessee encountered dense fog outside the Golden Gate when it arrived the evening of March 6, 1853.

There was no lighthouse outside the Golden Gate to help the Tennessee make port, nor any fog signal. Her wreck helped spur a slow-acting Congress to approve a recommendation made in 1850, that the Point Bonita lighthouse be built. The light

finally gleamed in 1855.

The Tennessee's skipper had nothing but his own seamanship to bring him safely to port. Keeping up steam, the vessel crept toward the gate by dead reckoning. The captain ordered soundings. The lead repeatedly showed 6 to 7 fathoms under her oak keel (36 to 40 feet).

Suddenly, land loomed out of the fog.

The mariners thought it was South Head, on the opposite side of the Golden Gate from where they really were. The seamen realized that the Tennessee also had passed over a reef, which was now astern.

There was no room to turn and get back to deeper water. The surf pushed the ship broadside onto the sloping bottom of the beach; the ship heeled far over on its port side.

The next day at high tide, two steam tugs huffed and puffed and hauled away, but could not break the grip of the surf-borne sand piling up against the ship. The surf turned meaner in following days. Waves ripped away the Tennessee's oak keel, then stripped away the planking of the hull. The \$300,000 vessel was declared a total loss.

Today, Whalen announced that the shipwreck site will be protected; amateur relic-hunting won't be allowed.

Under Park Service supervision, staff and a handful of volunteer experts will catalogue some 400 fragments of wreckage recovered so far and stored at Fort Mason. The finds include hand-blown bottles, brass spikes, pieces of cast- or wrought-iron catwalk and a port-hole.

Any excavation will be only on a limited basis, Whalen said.

